USING MULTIPLE ROBUST PARAMETER DESIGN TECHNIQUES TO IMPROVE HYPERSPECTRAL ANOMALY DETECTION ALGORITHM PERFORMANCE

THESIS

Matthew Davis, Captain, USAF

AFIT/GOR/ENS/09-05

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

AFIT/GOR/ENS/09-05

USING MULTIPLE ROBUST PARAMETER DESIGN TECHNIQUES TO IMPROVE HYPERSPECTRAL ANOMALY DETECTION ALGORITHM PERFORMANCE

THESIS

Presented to the Faculty
Department of Operational Sciences
Graduate School of Engineering and Management
Air Force Institute of Technology
Air University
Air Education and Training Command
in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Operations Research

Matthew Davis, B.S.
Captain, USAF

March 2009

AFIT/GOR/ENS/09-05

USING MULTIPLE ROBUST PARAMETER DESIGN TECHNIQUES TO IMPROVE HYPERSPECTRAL ANOMALY DETECTION ALGORITHM PERFORMANCE

Matthew Davis, B.S.

Captain, USAF

Approved:

Kenneth W. Bauer, Jr., Ph.D. Chairman	Date
J.O. Miller, Ph.D. Member	Date

AFIT/GOR/ENS/09-05

Abstract

Detecting and identifying objects of interest is the goal of all remote sensing. New advances, specifically in hyperspectral imaging technology have provided the analyst with immense amounts of data requiring evaluation. Several filtering techniques or anomaly detection algorithms have been proposed. However, most new algorithms are insufficiently verified to be robust to the broad range of hyperspectral data being made available. One such algorithm, AutoGAD, is tested here via two separate robust parameter design techniques to determine optimal parameters for consistent performance on a range of data with large attribute variances. Additionally, the results of the two techniques are compared for overall effectiveness. The results of the test as well as optimal parameters for AutoGAD are presented and future research efforts proposed.

Acknowledgements

I must first thank my wife and daughters for their unwavering support throughout this journey. Their constant encouragement has been central to achieving this goal. They have sacrificed much, and I'm very grateful.

I must also express my gratitude to my advisor, Dr. Kenneth Bauer. His support and guidance during this research effort was invaluable to me. I would also like to thank Dr. J.O. Miller for his direction and assistance in producing a better final product.

Special thanks go to my peers, Maj Michael Miller, Maj Glen Shilland, Capt Christopher Arendt, Capt Andrew Chaney, and Capt Emily Knight. Their collaboration thoughout the many disparate efforts that constitute research was indispensable.

Matthew Davis

Table of Contents

List of Figures

Figure		Page

List of Tables

Table		Page

USING MULTIPLE ROBUST PARAMETER DESIGN TECHNIQUES TO IMPROVE HYPERSPECTRAL ANOMALY DETECTION ALGORITHM PERFORMANCE

1. Introduction

The overarching goal of all remote sensing, regardless of the specific technology employed, is the ability to detect and identify objects of interest within a relatively large area while maintaining some measure of separation between the sensor and the area of interest. The increasing availability and quality of hyperspectral remote sensing technology has created a need for ways to quickly and accurately detect and identify objects of interest within a rapidly growing library of hyperspectral data. This research seeks to improve upon the speed, accuracy, and robustness of autonomous detection methods previously proposed in the technical literature. Robust parameter design is a technique well suited to optimizing existing detection methods.

1.1 Background

The past two decades have seen the development of various methods for target detection in hyperspectral imagery (HSI). The motivations for these methods are as varied as the methods themselves, but the problem is essentially universal; find a small number of unique objects scattered across a relatively large area [12]. Regardless of the specific object of interest, HSI and its subsequent analysis has proven an effective tool for extracting object location and type from an area of interest.

Historically, analysis methods have framed the problem of target detection in mainly two ways. The first approach uses the unique spectral signatures of the mate-

rials within the image and compares them to known reference signatures in order to identify an object [13]. Most of the time, however, reference signatures are unavailable and some other methodology must be employed to detect and identify objects of interest. This leads to the second approach proposed in the literature. In this approach, the spectral signatures of pixels within an image are compared to the other pixels within the image. Anomalous pixels are identified by their relative nonhomogeneity with respect to the other pixels in the image. This particular approach can be further divided into two separate methodologies that will be explained in greater detail in Ch. 2.

1.2 Methodology

The idea of detecting anomalous pixels within an image without *a prioi* knowledge of targets' unique spectral signatures is a more appropriate approach to the problem faced by the Department of Defense. Within the military context, detection and identification of targets takes on added complexity in that targets 'do not wish to be found' and will typically be concealed within the background in some way. The methods for concealment are varied, but appropriate application of target detection techniques to hyperspectral data can locate all but the most well hidden targets. Additional constraints are placed on the DoD problem instance by the need for fast solutions. Johnson [5] highlights this with his assertion that some future evolution of the autonomous global anomaly detector (AutoGAD) algorithm could potentially be run by a UAV's processing software and provide information on potential targets in real time. This kind of real time detection is critical to meaningful employment of HSI technology at the tactical and operational level.

With any new algorithm or approach to solving a problem, the quality of the method should be evaluated solely on observed performance. In order to make quantitative assessments, the solution methodology should be tested on problem instances with known solutions so that comparisons to known optimal values can

be made. Based on this comparison to ground truth, performance statistics are developed. These performance statistics are then used to evaluate the quality of the proposed method relative to existing methods and their performance statistics on the same problem instances.

While this practice is widely used in the literature, Hooker [4] suggests that this competitive testing approach leads researchers to tweak the parameters of their algorithm to outperform others on the test problems. This over-specification of the algorithm can lead to very poor performance on a broader set of real world problems.

The anomaly detection algorithm, AutoGAD, developed by Johnson [5] was shown to work well for the four images used during initial testing. However, as with most algorithms, similarities between the development and test data, combined with limited test data led to a situation where the algorithm is known to work very well for data similar to the development and test data, but its solution quality for other data types is unknown.

One alternative to this competitive testing is using Design of Experiments (DOE) to evaluate the performance of an algorithm. DOE provides a methodology allowing the researcher to make statistically sound inferences about algorithm performance over a range of problem instances using a relatively small number of test runs. A subset of the DOE framework, Robust Parameter Design (RPD), is a general method developed by Taguchi in the early 1980s that emphasizes choosing the levels of controllable parameters to: (1) ensure that the mean of the output response is at a desired level and (2) ensure that the variability around this target value is as small as possible [8].

Framing anomaly detection using AutoGAD as a RPD problem facilitates the selection of optimal user defined parameters within AutoGAD making the algorithm robust to a wide variety of image types. Additionally, these parameters reduce the variability of AutoGAD's performance. Therefore, the result is twofold; the

optimized parameters allow AutoGAD to perform anomaly detection not only well, but more importantly, perform consistently over a wide variety of image types.

1.3 Research Objectives

This research will employ robust parameter design to develop additional testing scenarios for AutoGAD in order to determine is applicability and effectiveness over a wide range of image types. Additionally, optimal settings for the multiple user adjustable parameters present in the algorithm will be determined.

The remainder of this thesis is organized as follows. Chapter 2 contains a discussion on the basics of HSI, a more detailed description of the detection methodologies proposed in the current literature, and a discussion of robust parameter design based on a review the literature. Chapter 3 describes how robust parameter design was specifically applied to AutoGAD including a detailed description of the experiment performed. Chapter 4 includes the results of the experiment and the resultant optimized algorithm parameters. Chapter 5 summarizes the work and suggests directions for future research.

2. Literature Review

2.1 HSI Basics

HSI is, at the most basic level, a digital photograph. Like a digital photo, HSI is composed of picture elements, or pixels, which divide the two dimensional space of the scene into smaller regions. The pixels create a grid which can be indexed in both dimensions to form a referencing structure allowing each pixel within an image to be individually referenced. In a standard digital photo, each pixel contains information about a portion of the electromagnetic (EM) spectrum, namely the visible portion. The visible portion, can be subdivided into bands, for instance the red, green, and blue. Each pixel is assigned an intensity level within each band, the combination of which determines the overall color or reflectance signature of the pixel. HSI is based on these same ideas, however, it differs from ordinary photos in several ways.

The first, and most important difference between standard digital photographs and HSI is the number of bands. Where standard photos can be represented in as few as one band (black and white photos), HSI is composed of anywhere from tens to hundreds of contiguous bands [12]. The second difference between standard photography and hyperspectral imaging is the range of EM energy represented within a single image. While standard photos only represent energy from the visible wavelengths, HSI, in general, contains contiguous data from mid-wave infra-red to ultra-violet wavelengths. Figure 2.1 highlights the portion of the EM spectrum used by HSI sensors.

Now that a basic analogy for HSI has been drawn from standard photography, The reader should be familiarized with how the data from an HSI image is organized for processing and analysis. HSI data can be thought of as a cube or 3-dimensional matrix of data. The front face of the cube is defined by the spatial dimensions of the image. Viewing the data from this orientation is analogous to looking at the image printed on a page or displayed on a screen. The third dimension of the data

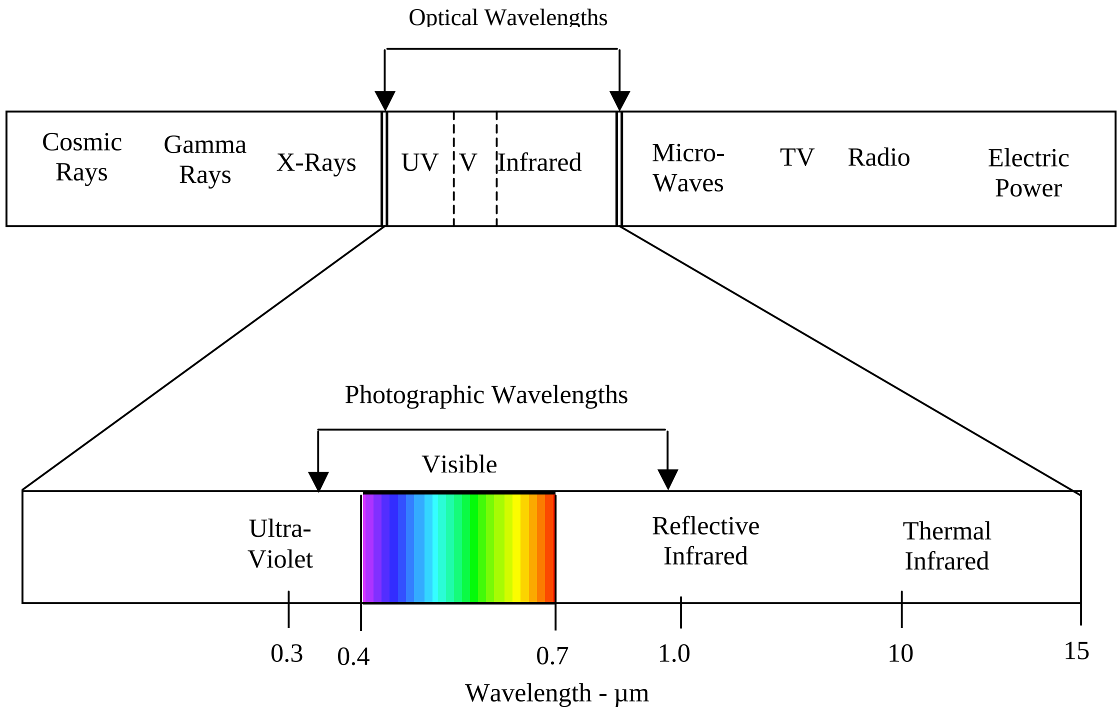


Figure 2.1 Electromagnetic Spectrum [6]

represents the spectral dimension of the data. This dimension can be thought of as a stack of images, each capturing a very narrow piece of the scene's EM reflectance spectra. Figures 2.2 and 2.3 illustrate this idea. According to these definitions, each cell within the data cube can now be indexed, first by its two spatial dimension values, and then by its spectral dimension. Each cell can now be referenced by a coordinate triple, (i, j, k), where i and j represent the spatial coordinates of a pixel within the image and the value within the cell is the pixel's reflectance response in the k^{th} spectral band.

Visualizing the data as a cube is useful for understanding where the data comes from and how it is organized spatially, but maintaining the data in this format is not useful for analysis. The most efficient structure for doing the various manipulations is a two-dimensional matrix. Transforming the data to this format is straightforward and will be illustrated by example. Let C be the data from a hyperspectral image 100 pixels wide by 150 pixels long and containing 200 contiguous spectral bands resulting

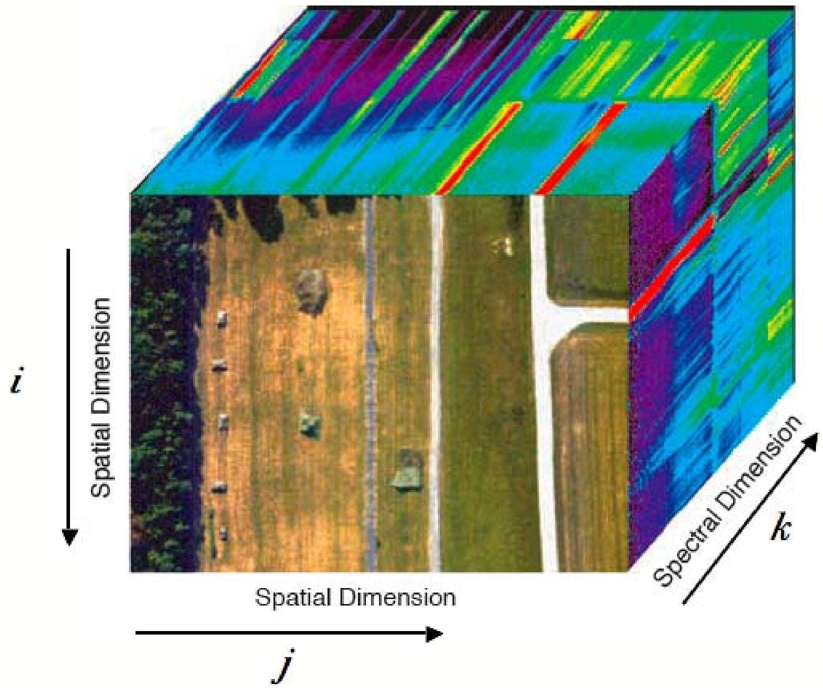


Figure 2.2 Dimensions of Hyperspectral Data Cube [11]

in 15000 pixels each containing 200 elements of spectral data. Each of these 15000 200 by 1 pixel vectors can then be made a column in a new matrix. This new matrix is 200 rows by 15000 columns and each column contains the spectral data of a single pixel from the original image. The transformation process is visualized in Figure 2.4

2.2 Approaches to HSI Analysis

There are currently two major approaches to finding objects of interest. One approach taken by some is to develop or obtain ground truth signatures for particular objects or materials of interest then compare this true signature to the signature of each pixel within an image. Pixels whose signatures match the ground truth signature to within some statistical threshold are nominated as potential target locations. While this technique seems logical, there are several situations where this methodology breaks down. The first and most frequent problem encountered when employing this technique in an autonomous way is the lack of ground truth signature

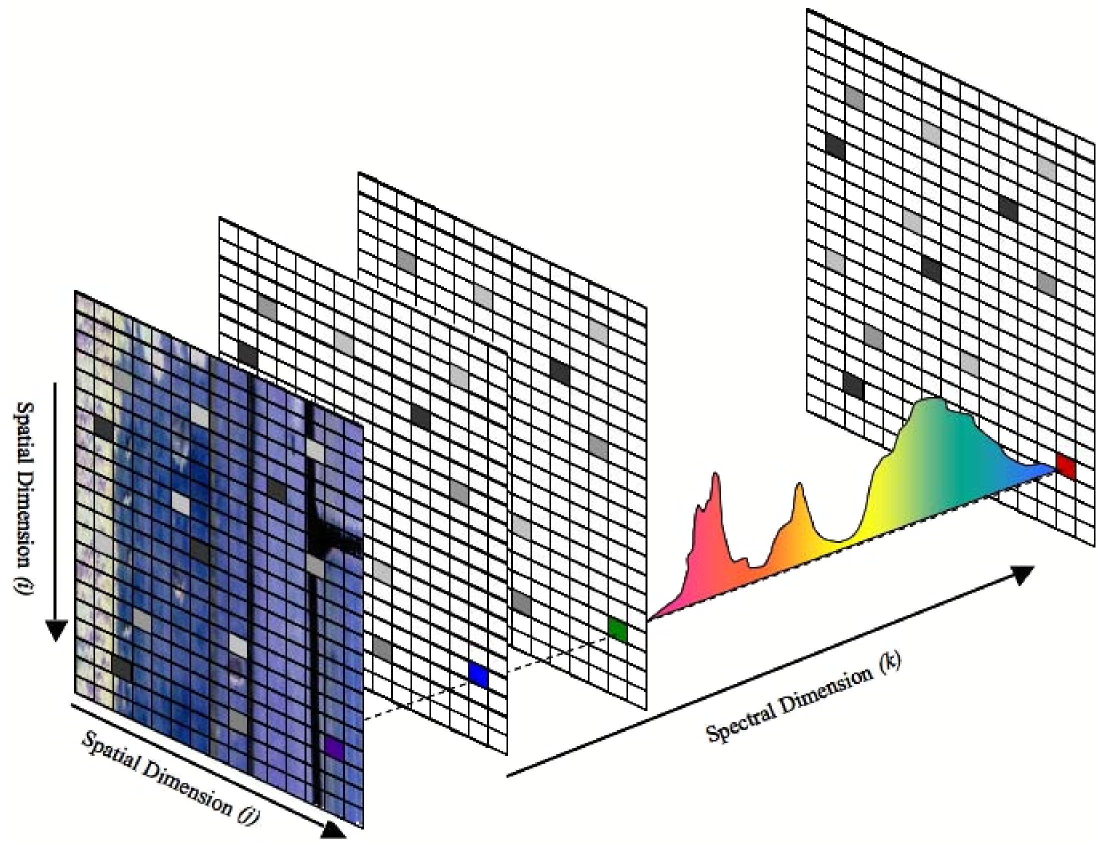


Figure 2.3 Spectral Layers of Hyperspectral Data Cube [7]

data for the objects within a particular scene that may be of interest. Secondly, high spectral resolution sensors are significantly impacted by environmental effects at the time the image of interest is created. Time of year, time of day, relative humidity, and imaging angle are just a few of the factors that effect how much and what type of reflectance data reach the sensor during a given image capture sequence. Since these environmental factors vary through time, reflectances from the materials of a particular area can vary greatly from one image to the next.

These obstacles make the development of a robust autonomous signature matching algorithm difficult. The other family of detection methodologies is referred to as Anomaly Detection. This approach can be subdivided further into two types; distribution based anomaly detectors (local or global) that assume a distribution

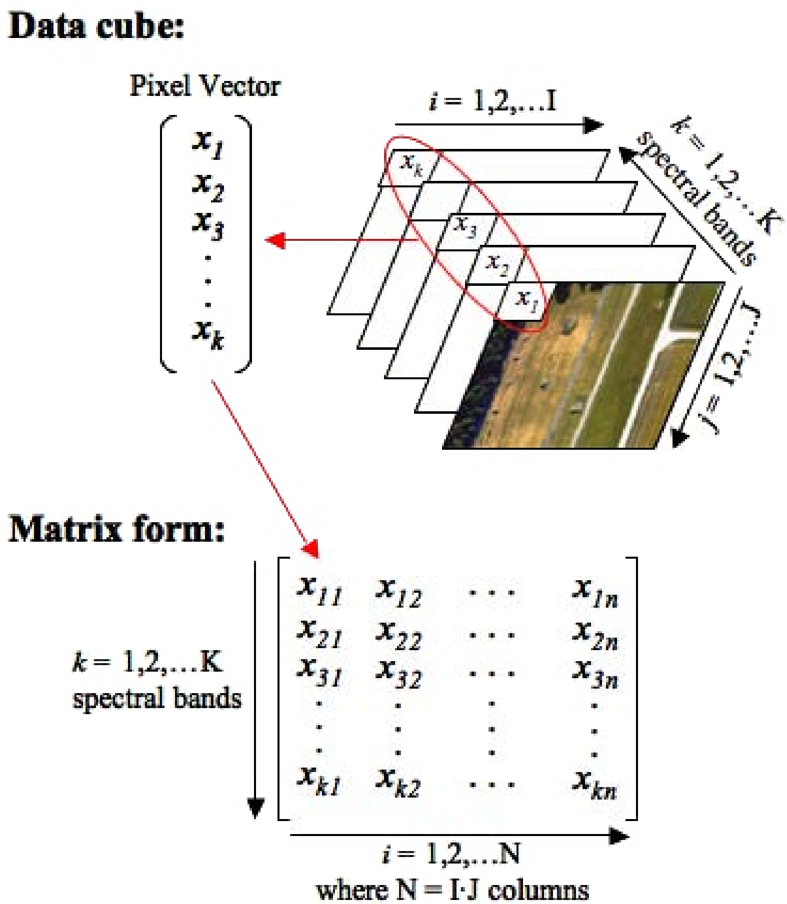


Figure 2.4 Transforming a HSI data cube into a data matrix [7]

(typically normal) of the pixel vectors, and global linear mixture model detectors [5].

Local anomaly detectors consider each pixel individually comparing its reflectance values to the mean and covariance values of its neighboring pixels. Multivariate statistical tests are used to declare the pixel an outlier with respect to its neighborhood. The definition of the neighborhood is unique to each instance of this type of detector, but is usually 8∼50 of the pixel's nearest neighbors. These types of models are usually referred to as local normal models since they assume Gaussian distributions of the pixel vectors [5].

The other type of distribution based detectors are referred to as global normal mixture models. These models assume an image contains some number C of material types, or endmembers. These endmembers each have a specific spectral signature within the image. Each pixel is then assumed to be composed of a random vector having one of several multivariate Gaussian (normal) distributions. The probability density function (pdf) of the scene is a Gaussian mixture distribution:

$$g(\underline{x}) = \sum_{c=1}^{C} \pi_C N(\underline{x}|\underline{u}_C, \Sigma_C); \pi_c \geq 0; \sum_{c=1}^{C} \pi_c = 1 \qquad (2.1)$$

where π_c is the probability of belonging to endmember c [15]. This methodology is effective, but Smetek [13] notes that no guidance is available for determining the number of endmembers $|C|$ in a particular image.

The remaining methodology is an approach known as global linear mixture model anomaly detection. Like global normal mixture models, this approach assumes the image contains some deterministic number of endmembers, C. However, the global linear mixture model assumes each pixel's total reflectance is linear combination of the reflectances' of each of the endmembers present in the image. The coefficients of each of the C terms in the linear combination that makes up a particular pixel's total reflectance can be interpreted as the fractional abundance of the endmembers within that pixel [15].

This global linear mixture approach is used by Johnson [5] to develop AutoGAD. Since the subject of this research is not to develop a new approach, but rather to optimize the application of Johnson's algorithm, more rigorous development of these methodologies are omitted.

2.3 Overview of AutoGAD

The AutoGAD algorithm developed by Johnson [5], is a multi-step approach to assisting imagery analysts by identifying potential targets within raw hyperspectral image data. There are several user-adjustable parameters built in to the algorithm and these will be central to the Robust Parameter Design problem to be developed later. However, in order to make these parameters meaningful to the reader, an overview of AutoGAD is appropriate.

The reader should note that the following is entirely a paraphrase of Johnson's work and as such will only be referenced here [5], however, his references to other works are repeated where appropriate.

Recalling section 2.2, the initial step of any HSI analysis tool is to prepare the data for analysis by converting it from a 3-dimensional cube to a 2-dimensional matrix. Once this conversion is complete, the detection algorithm consists of four phases. These phases are depicted in the flow diagram in Figure 2.5.

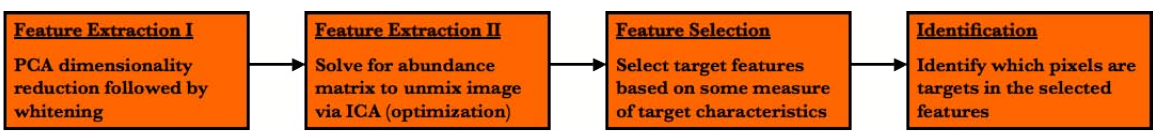


Figure 2.5 Process Flow for Target Detection [5]

The first step, Feature Exraction I, involves dimensionality reduction and whitening of the data. Dimensionality is typically reduced using Principal Components Analysis (PCA). PCA is a widely used analysis technique that projects data into a subspace whose dimensions maximize the variance of the data. The dimensions of this new subspace are ordered according the variance of the data captured by each dimension or principal component. Thus, the first principal component contains the most variance, the second principal component contains the second most variance and so on. Once the data is projected into this new, variance-ordered space,

it is whitened. Whitening of the data simply means that the data is centered and scaled so that is has mean 0 and unit variance.

Now that the data has been whitened in a projection space where variance is maximized, the amount of variance to be retained must be determined. This number of dimensions and subsequent amount of variance to be retained is determined by Johnson's Maximum Distance Secant Line (MDSL) method [5]. The proper dimensionality suggested by may be adjusted by the user to consistently keep more or less dimensions than the technique suggests as appropriate.

The second step, Feature Extraction II, utilizes a piece of software called FastICA to conduct Independent Component Analysis (ICA). Further projecting the data into independent components rather than the uncorrelated ones that result from PCA serves to comply with the assumption of the Linear Mixture Model (LMM) that the components are, in fact, independent. The LMM is one of several ways of characterizing imagery data where multiple types of objects, each with their own distinct spectral signatures, make up the spatial region of a scene. For instance, one particular image may contain grass, dirt, concrete, rocks, and vehicles. Each of these would have a distinct spectral signature and ideally each of their signatures would be represented by a dimension of the data after ICA is performed. If this occurs, then when each of the components is spatially plotted, one image shows only grass, another only concrete, another only the vehicles, and so on. Thus, the vehicles, presumably of interest to the analyst, have been isolated from the rest of the image.

Feature Selection, the third step, takes the data plotted on the components generated by FastICA and determines which components or features within the data have the potential to be targets. It does this by exploiting the assumption that targets are rare and small within the scene. If these properties hold for the targets within an image, the number of pixels that have high a percentage of a target's spectral signature will be small, while the number of pixels that contain a high percentage of non-target signatures will be significantly higher. By plotting the

frequency histogram of pixel scores for a particular dimension and distinguishing targets from background by finding the first score bin without any pixels, a portion of the pixels can be classified as background while the remaining are classified as potential targets. Placing these two values in ratio, a Potential Target Signal to Noise ratio is created. Thus, a noise floor for SNR can be set and applied to the by-component histogram plots. Any plot with an SNR below the noise floor is determined to be representative of a non-target spectral signature. Plots with SNR's above the noise floor represent potential target signatures.

The fourth and final step, Identification, reexamines the plots with SNR's above the noise floor and the high scoring pixels within those plots are considered as targets. Pixels whose scores are very close to zero bin cut line have high potential for misclassification. To mitigate this misclassification potential, Johnson employed an amplification technique called Iterative Adaptive Noise Filtering. This process iteratively multiplies any score above the cut line by a number greater than 1 while scores below the cut line are multiplied by a number smaller than one. After many replications, all pixels scores are well separated and visual representations of these new scores are near black and white when plotted on a gray scale. This gives potential targets high contrast from the background improving the designation capability of AutoGAD.

2.4 Robust Parameter Design

In almost all processes, whether manufacturing, transportation, or anomaly detection, process managers desire some optimized process output that varies as little as possible between products, shipments, or images. Robust Parameter Design (RPD) is a method for reducing process or product variation developed by Genichi Taguchi and introduced in the United States in the early 1980's. While Taguchi's philosophy was met with great interest and was implemented by several large corporations, his methodology became a source of contention within the community of

statisticians and quality engineers. The questionable analysis techniques Taguchi suggested were unacceptable to some and as a result, the response surface approach has been suggested as a collection of tools that allow Taguchi's concepts to be applied using a more statistically sound and efficient approach to analysis [10]. Both approaches will be used during this research, and each will be developed in more detail in the following sections.

In general, RPD seeks to simultaneously produce some target response from the system while minimizing the variance of that response. These, at times competing, objectives are achieved by adjusting settings of controllable factors to both manipulate the value of the response and dampen the effect of uncontrollable, or noise factors within the system. RPD takes advantage of this two class variable structure and correlation between the classes to locate optimized settings. The two classes of variables are control variables and noise variables. Control variables are those variables in a process that remain unchanged once selected, therefore adding no variation. Noise variables are factors that are difficult to control during normal process operation and may change without warning [2].

A critical piece of the variable structure is correlation between at least some of the control and noise variables. If all the noise variables are completely independent of the control variables, then their variance will remain constant across the entire range of the control variables. If however, some interaction between control and noise variables exists, then some point or set of points in the control space produces minimum variance across the range of noise variables. This point is well illustrated in Figure 2.6, where the change in response across the range of noise from low to high is minimized when the control is set to high.

Given this interaction between control and noise factors, controls can be classified into at least one of three groups, otherwise they are insignificant and removed from consideration. The first classification of control factors is determined by their influence on the response. If control factors influence a change in response as they

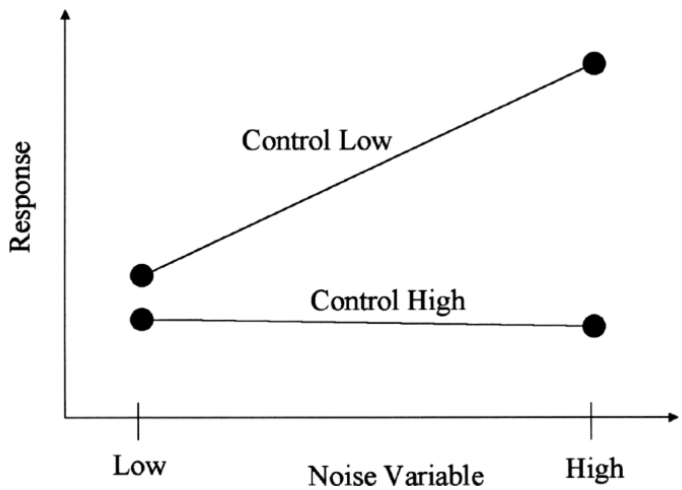


Figure 2.6 Control-by-Noise Interaction Plot [2]

move across their range, then they are said to be location factors. Control factors that interact with noise variables are called dispersion factors. Finally, control factors that are location factors (affect mean process response), but are not dispersion factors (do not interact with noise factors) are called adjustment factors [2].

2.4.1 Crossed Array Designs — The Taguchi Approach

The use of orthogonal arrays in experimental design is central to the methodology suggested by Taguchi. Specifically, an orthogonal array for the control variables called the inner array is crossed with an orthogonal array for the noise variables called the outer array [10]. An example experiment of this type is illustrated in Figure 2.7. In this example a 2^2 inner array is crossed with a 2^2 outer array. The resultant 16-run experiment consists of 4 repetitions of the outer array; one at each of the inner array design points. Designs of this type are not necessarily full factorial in nature. Reduced resolution designs can, and often are, used in both the inner and outer arrays. However, the outer array design, whatever its size, must be completed at each of the inner array design points.

Taguchi suggested that the data collected from each outer array could be rolled into a single summary statistic providing information about the mean and variance.

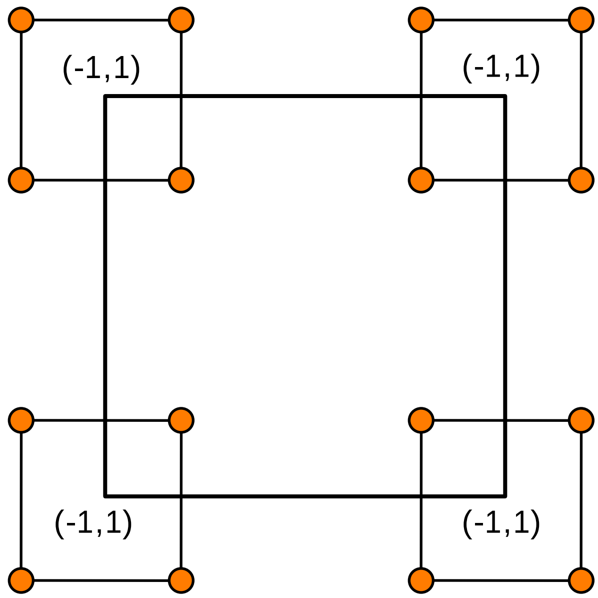


Figure 2.7 $2^2 \times 2^2$ crossed array [10]

For instance, in Figure 2.7 each dot represents an observation, so each block of 4 dots would have its own summary statistic which Taguchi calls a signal-to-noise ratio (SNR) [10].

SNR is a broad term defined in myriad ways by authors across a wide variety of technical disciplines. However, Taguchi suggests 4 primary definitions for SNR. He categorizes them by the optimality conditions defined for the response of interest:

Smaller is better – Optimality is a minimized response

Larger is better – Optimality is a maximized response

Target is best – Optimality is a response equal to some target value

Before beginning a discussion of the types of problems and the SNR's Taguchi proposed to help solve them, it is important to determine how potential robust solutions will be compared to each other. It is intuitive to simply compute the difference between the response of the current solution and the optimal response and use these differences to rank potential solutions. However, in cases where multiple potential solutions may exist, some smaller and some larger than the optimal one, simply

computing the difference by subtracting the optimal solution from the potential responses may lead negative distance to optimality. Thus, a squared distance function, known as a quadratic loss function is used to evaluate the quality of potential solutions. The generalized quadratic loss function expressed in terms of the expected value of the response is given in Equation 2.2 where L is the square of the distance between the expected value of the response and the target value.

$$L = E_z(y - t)^2 \tag{2.2}$$

2.4.1.1 Smaller is Better

In the case where a smaller response is better the target value of the response, t is assumed to be zero. Thus, Eq 2.2 reduces to $L = E_z(y)^2$ and the SNR for this case is given below in Equation 2.3.

$$\mathrm{SNR}_s = -10 \log \sum_{i=1}^{n} \frac{y_i^2}{n} \tag{2.3}$$

This formulation for SNR results from a need to find control variable values that minimize the expected square error $E_z(y)^2$, where E_z is the expectation of response across the noise variable distribution. Thus, the SNR is computed by summing the square errors observed in each outer array and dividing that sum by the number of observations or points in the outer array, n. An SNR is then computed at each design point in the inner array and maximized, since the $-10 \log$ transformation is used [10].

2.4.1.2 Larger is Better

In problems where maximization of the response is the goal, y in Eq 2.2 is replaced by $1/y$. This allows L to approach zero as the value of y increases and, again the expected square error reduces to $E_z(1/y)^2$. The SNR for problems where larger response is better is given in Equation 2.4. Just as before, control variable settings that maximize the SNR are best [10].

$$\mathrm{SNR}_l = -10 \log \sum_{i=1}^{n} \frac{1/y_i^2}{n} \tag{2.4}$$

2.4.1.3 Target is Best

In this instance, the control variables are adjusted to bring the response to some target level. This can be thought of as the Goldilocks case: 'Not too hot, not too cold, but just right' [14]. Taguchi proposed two different SNRs for this case with the nature of the system determining which is proper.

The first system to be considered is one where the mean and variance of the response can be altered independently. Because of this independence, a two step analysis is employed to locate on target and robust control factors. Taguchi suggests as a first step in the analysis to adjust the controls that affect mean response, called tuning factors, such that $E_z(y) = t$. Adjusting these tuning factors has no effect on variance, so the SNR remains unchanged during this step. The second step is adjust the remaining factors such that the SNR is maximized. If the first step is successful, the tuning factors are set such that $y = t$ and the square error loss function, $E_z(y - t)^2$, reduces to $\mathrm{Var}(y)$, thus the SNR is given by Equation 2.5, where s^2 is the sample variance of the responses in each outer array. Once again, the $-10\log$ transformation is used so that minimizing s^2 maximizes SNR [10].

$$\mathrm{SNR}_{T_1} = -10 \log s^2 \tag{2.5}$$

The second type of target-is-best system is one where response variance is related to response mean. This relationship is hopefully linear, but nonetheless prevents the independent adjustment of tuning factors to bring the mean on target. If the mean variance relationship is linear, a coefficient of variation is easily computed by σ_y/μ_y. The two step analysis can again be accomplished by adjusting tuning factors to bring the mean on target while leaving the variation coefficient unchanged. The SNR is now computed using the Equation 2.6, where $\bar{y}^2/s^2$ is the squared inverse of the sample coefficient of variation [10].

$$\mathrm{SNR}_{T_2} = 10 \log \left(\frac{\bar{y}^2}{s^2} \right) \tag{2.6}$$

For a variety of reasons, Taguchi's suggested SNRs described above are criticized in later literature. First, with the exception of the SNR in Eq 2.6, they contain some transformation of the units of the response of interest. Despite these questionable formulations, the critique most often encountered in the literature is the confounding of mean and variance into a single measure. Many authors propose the development of separate models for mean and variance[1, 9, 16]. The motivation being to gain better understanding of the process itself and thus be able to make better decisions about where tradeoffs between mean and variance of the response can be made. A final problem with the confounding of mean and variance is that multiple control factor setting combinations may produce identical SNRs, thus the interpretation of a particular SNR is unclear with regard to the specific control settings that produced it [10].

2.4.2 Combined Array Designs – Response Surface Methods

One alternative the previously mentioned authors propose is the use of response surface methodology (RSM), which has become widespread in solving RPD problems. RSM gives the analyst the ability to develop a designed experiment so the relationship between controls, noise, and response can be modeled. Typically, a second order response surface model is developed. This provides linear effects from controls and noise, as well as quadratic effects from controls, and interaction effects between controls and noise. The general form of the model is given by Eq. 2.7.

$$y(\mathbf{x}, \mathbf{z}) = \beta_0 + \mathbf{x}'\beta + \mathbf{x}'\mathbf{B}\mathbf{x} + \mathbf{z}'\gamma + \mathbf{x}'\Delta\mathbf{z} + \epsilon \tag{2.7}$$

In Eq. 2.7, β and γ are vectors of coefficients for control and noise main effects, $\mathbf{B}$ is a matrix of coefficients of the quadratic control effects, Δ is a matrix of control-by-noise interaction coefficients, and pure error is given by $\epsilon_i \sim N(0, \sigma^2)$. The variance of Eq. 2.7 is now easily obtained by treating the noise $\mathbf{z}$ as a random variable [9] and applying the variance operator to Eq 2.7. The variance equation is

$$\text{Var}_z[y(\mathbf{x}, \mathbf{z})] = (\gamma' + \mathbf{x}'\boldsymbol{\Delta})\text{Var}_z(\mathbf{z})(\gamma' + \mathbf{x}'\boldsymbol{\Delta})' + \sigma^2, \tag{2.8}$$

where $Var_z(\mathbf{z})$ is the variance-covariance matrix of $\mathbf{z}$. Expanding this equation for multiple noise factors (z_i, z_j), yields the following result,

$$\begin{aligned} \text{Var}_z[y(\mathbf{x}, z_i, z_j)] =& (\gamma_i + \mathbf{x}\Delta_i)^2\text{Var}(z_i) + (\gamma_j + \mathbf{x}\Delta_j)^2\text{Var}(z_j) \\ &+ 2(\gamma_i + \mathbf{x}\Delta_i)(\gamma_j + \mathbf{x}\Delta_j)\text{Cov}(z_i, z_j) + \sigma^2. \end{aligned} \tag{2.9}$$

2.4.2.1 Types of Noise

Eq. 2.9 above maintains the treatment of $\mathbf{z}$ as a random variable. However, there are a couple assumptions made about noise when it is known to be a continuous variable

that help to reduce the complexity of the variance computation suggested by Eq. 2.9. The first and broadest assumption is that certain attributes of the distribution of $\mathbf{z}$ are known. Specifically, the variance-covariance matrix of $\mathbf{z}$ is assumed to be known. Additionally, it is often assumed that the covariance between noise variables is zero. Taking these assumptions into account the new variance model is given by Eq. 2.10. [2]

$$\mathrm{Var}_z[y(\mathbf{x}, z_i, z_j)] = (\gamma_i + \mathbf{x}\Delta_i)^2\mathrm{Var}(z_i) + (\gamma_j + \mathbf{x}\Delta_j)^2\mathrm{Var}(z_j) + \sigma^2 \tag{2.10}$$

If however, the noise variables are categoric instead of continuous, the assumptions made above can be avoided. In general, making less assumptions provides a more accurate analysis. Generating a variance model with categorical noise variables is not difficult, especially since any number of categorical variables with any number of categories can always be reduced to a single categorical variable with r_z categories, where r_i is the number of categories of the i^{th} of n noise variables, and

$$r_z = \prod_{i=1}^{n} r_i - 1 \tag{2.11}$$

where 1 is subtracted to account for a baseline category.

Since all noise is now captured within a single categorical variable with multiple categories, the probability of occurrence for each category can be computed. In most cases, the probabilities of each categorical noise factor are known *a priori*, and if they aren't, a uniform distribution is a reasonable assumption since it provides equal opportunity for each type of noise and thus a uniformly robust solution should result. These probabilities, $\mathrm{P}(\text{Category } i) = p_i$, have a multinomial distribution, thus the variance-covariance matrix is fully characterized as long as the p_i's are known.

Using dummy variables:

$$z_i = \begin{cases} 1, & \text{Category} = i \\ 0, & \text{otherwise} \end{cases} \qquad i = 1, 2, \ldots, r_z, \tag{2.12}$$

the variance-covariance matrix is given by

$$\mathbf{Var_z}(\mathbf{z}) = \begin{bmatrix} p_1(1-p_1) & -p_1p_2 & \cdots & -p_1p_{r_z} \\ -p_2p_1 & p_2(1-p_2) & \cdots & -p_2p_{r_z} \\ \vdots & \vdots & \ddots & \vdots \\ -p_{r_z}p_1 & -p_{r_z}p_2 & \cdots & p_{r_z}(1-p_{r_z}) \end{bmatrix} \tag{2.13}$$

The test range for continuous noise variables is generally selected such that the center of the range is the estimated mean and the high and low levels are ± 1 or ± 2 standard deviations from the mean. These values are set prior to conducting the experiment, thus failing to account for observed process variation and inducing error in the analysis. Additionally, if more than one noise variable exists, any covariance between them is assumed to be zero, inducing even more error in the model. These error inducing assumptions that must be made to conduct continuous noise analysis are, in the categorical noise case, traded for a single, much less risky assumption that must only be made in rare cases where the p_i's for each category cannot be computed. Furthermore, when the assumption of equal probability must be made, it leads to conservative analysis in that it provides a solution that is robust across all noise categories.

3. Methodology

The previous chapter gave a brief overview of the AutoGAD algorithm and two approaches to RPD. This chapter will begin with a description of the input variables from AutoGAD that will serve as the control and noise space and give a short description of the Measures of Performance used to quantify response. Then a description of how, using the two approaches, RPDs are developed for AutoGAD.

3.1 Inputs

As described in Ch. 2, the AutoGAD algorithm is rather complex and highly customizable. This end-user flexibility creates myriad sources of response adjustment as well as a large control-noise interaction space. Table 3.1 lists both the control and noise input parameters.

The first control factor, Dimension Adjust, allows the user to keep more or less dimensions for analysis than suggested by the MDSL technique employed during the FE I phase. The second control, Max Score Threshold, is the cut line for raw IC pixel scores above which a pixel becomes a candidate to be a potential target. Bin Width SNR determines the bin width used during the zero-detection histogram method for determining which IC maps contain targets. PT SNR Threshold is similar to Max Score Threshold, but is on the SNR scale and is used only on IC's nominated as containing targets. It is used to decide which pixels have a high enough SNR to actually be targets. Likewise, Bin Width Identify, determines bin width during the zero-detection histogram procedure during the Identification phase. Smooth Iterations High and Low determine the number of iterations of the IAN filtering process for low and high SNR objects respectively. Low SNR is the decision point between low and high SNR. The ninth control, Window Size, determines the window size used for the IAN Filtering subroutine. Both the tenth and eleventh controls are binary, on/off, controls. Threshold both sides makes a decision about considering

Input Parameter	Type	Classification	Test Range
Dimension Adjust	Discrete	Control	[-2, 2]
Max Score Threshold	Continuous	Control	[6, 14]
Bin Width SNR	Continuous	Control	[0.01, 0.1]
PT SNR Threshold	Continuous	Control	[1, 6]
Bin Width Indentify	Continuous	Control	[0.01, 0.1]
Smooth Iterations High	Discrete	Control	[50, 150]
Smooth Iterations Low	Disrete	Control	[5, 45]
Low SNR	Continuous	Control	[4, 14]
Window Size	Discrete	Control	[1, 9]
Threshold Both Sides	Categorical	Control	[0, 1]
Clean Signal	Categorical	Control	[0, 1]
Image	Categorical	Noise	[1, 2, 3, 4, 5, 6, 7, 8]

Table 3.1 Control and Noise Factors and their ranges

pixels with large negative IC scores as potential targets. On (1), considers any pixel with large magnitude score, while off (0) only considers pixels in the direction of the largest magnitude score. Finally, Clean Signal turns the IAN Filtering subroutine on and off.

For this analysis, the single noise factor considered is the image data presented to the algorithm. While other noise variables exist within this problem instance, they are for the most part controllable relative to the presumably infinite space of possible image data that may be encountered during a real world implementation of this algorithm. Additionally, during this analysis the noise space was limited to 8 images taken from single set of image data. Similarities in the image data may lead to over-specification of the controls from a global perspective, but the data set is sufficient to illustrate the technique.

3.2 Outputs

While the single product of the AutoGAD algorithm is a scene map identifying potential target locations, this product is not directly quantifiable. Therefore, 4

Output Parameter	Units	Range
Time	Seconds	$[0, \infty]$
True Positive Fraction	N/A	[0, 1]
False Positive Fraction	N/A	[0, 1]
Target Fraction Percent	Percent (%)	[0, 100]

Table 3.2 Measures of Performance and their ranges

performance parameters related to target prediction map were collected and used to quantify algorithm performance.

The first and most intuitive parameter is time, measured in seconds from the instantiation to completion of the algorithm. The second parameter is True Positive Fraction (TPF) and is based on a comparison of AutoGAD predictions to ground truth. TPF is computed by dividing the number of pixels AutoGAD correctly calls targets by the number of target pixels in the ground truth image. False Positive Fraction (FPF) is the third measure of performance and is computed by dividing the number of non-target pixels erroneously declared targets by the algorithm by the number of non-target pixels in the ground truth data. The final measure of algorithm performance is Target Fraction Percent (TFP). TFP is simply the ratio of correct target declarations (the number of true positives) to all declared pixels (true positives plus false positives). Table 3.2 shows each measure of algorithm performance and its corresponding response range.

3.3 Crossed Array Method

Using the controls, noise, and responses described above a Taguchi-style crossed array RPD was developed. The details for development were adapted from the *Response Surface Methodology* text by Myers and Montgomery [10].

The design begins with the inner array, and Tbl. 3.1 suggests 11 control variables to be accounted for in the inner array. A two level, full factorial experiment on 11 variables would include $2^{11} = 2048$ runs per replication. Additionally, in order to

estimate quadratic curvature of the response across the variable range, a three level design is desirable but increases the number of runs required to $3^9 \times 2^2 = 78,732$. Thus, some fractional factorial experiment is necessary in order to make the experiment size practical. One such experiment type incorporating both three level structure and fractional designs are Central Composite Designs (CCD). CCDs are widely used to fit second-order models because of their high efficiency compared to other quadratic model generation techniques [8].

The development of a CCD inner array is complicated by the categorical nature of two of the eleven control variables, as shown in Table 3.1. These two controls must be tested externally to the CCD, thus nine variables remain. In order to avoid aliasing of main effects or two-factor interactions with either each other or themselves, a resolution V CCD must be selected. The smallest design available for nine factor problems maintaining the proper resolution contains 64 runs. This design is drastically smaller than the full factorial design leaving room for center points to be added as well. Six center points were added for a total of 70 runs within the CCD. These center points combined with the face points generated by setting the CCD alpha to one ensure sufficient variation of interacting control settings at any one control's observed levels. In order to properly account for the two level factors, the CCD must be replicated at each of the four level combinations of the categorical factors (Threshold Both Sides and Clean Signal). Replicating the 70 original CCD runs four times yields 280 runs total in the inner array.

In a standard Taguchi-style experiment, the outer array is simply a factorial (full or fractional) design based on the noise variables under consideration. In this case, only one variable (Noise) is being considered. This variable has 8 discrete levels which are representative of the potentially infinite real world image library that AutoGAD may encounter. Since there is only one factor at 8 levels, the outer array becomes an 8^1 full factorial design. This design consists of 8 runs, one at each image level.

When the the inner and outer arrays are crossed the resultant experiment is 8 replications of the inner array, one at each noise level. The total number of runs in the crossed array is $280 \times 8 = 2240$.

Development of the designed experiment was conducted using DesignExpert® Version 7.1.5 (DX7). This software package contains many useful tools for designing and analyzing experiments of this type. The desired experiment type; resolution; number of replications, blocks and center points; and control factor and response labels are input, and one of several outputs is a fillable spreadsheet for use during the data collection portion of the experiment. The sheet generated for the crossed array is provided in a blockwise manner in Figures A.1 through A.8 in the Appendix A.

Now that control and noise levels have been developed for each of the 2240 runs, a means must be devised to pass them to AutoGAD. For this purpose slight modifications were made to the AutoGAD function itself in the way that it reports the responses of interest. Additionally, a master function was built to iteratively load each run's control and noise levels and pass them to AutoGAD for execution. This master function then recorded the response values reported by AutoGAD and loaded up the next runs values until each run combination was completed and it's responses recorded. A copy of the MATLAB® code for AutoGAD and the master function are included in App. C.

Upon completion of the experiment, the collected response data along with it's corresponding control and noise parameter levels were exported to Microsoft Excel® for analysis. While the remainder of the analysis is straightforward, it nonetheless requires several steps detailed below.

The first step is to compute each response's mean at each design point in the inner array (IA). Recall the entire experiment is composed of 8 identical blocks which vary only in the noise factor. Therefore, the inner array, consisting of 280 design points was repeated at each level of the noise variable, and a mean response at each

of these points can be computed by summing the response values observed at each of the noise levels and dividing by 8. This computation is expressed mathematically in Eq. 3.1 where y_{ij} is the observed response at design point i and noise level j.

$$\bar{y} = \sum_{j=1}^{n} \frac{y_{ij}}{n} \tag{3.1}$$

The mean response given by Eq. 3.1 is computed for each of the four responses at each of the 280 IA design points. Additionally, SNR's are computed for each response at each point on the IA. The SNR equation used for this analysis is given in Eq. 2.6. This particular SNR was chosen for two reasons. First, using a SNR with a target-is-best approach allows it to be applied to all the responses of interest, even though two of the response have target values of zero while the other two responses have target values of one. Second, as noted by Myers and Montgomery [10], this is the only one of Taguchi's suggested SNR formulations that is truly unitless.

The second portion of the analysis is a technique called marginal means modeling. This analysis computes the marginal mean of the $\bar{y}$'s for each level of a particular control variable. This idea is illustrated in Tbl. 3.3 where the IA points are sorted based on *Dim Adj*. Then all mean time responses for IA points where *Dim Adj*$= -2$ are averaged to find the marginal mean response when *Dim Adj*$= -2$. Marginal means are computed for each level of *Dim Adj* observed in the IA. This process is repeated for each response at each level of each control variable in the IA.

Once marginal means for $\bar{y}$'s and SNR's are computed at each level of each control variable, they are then compared either within the table or by plotting the values across each control space in a pick-the-winner analysis [10]. The idea here is to pick the level of each control that has the desired effect on either the mean response, SNR, or both. Example plots generated using the data in Tbl. 3.3 are shown in Fig. 3.1.

	Control Variables			IA point response		Marginal Means	
	Dim Adj	...	Clean Signal	Mean Time	SNR_{Time}	Time	SNR_{Time}
Levels	-2		0	29.0887	-3.0449		
	⋮	...	⋮	⋮	⋮		
	-2		1	35.6386	-4.7822	32.3637	-3.9136
	0		0	18.7123	-5.4859		
	⋮	...	⋮	⋮	⋮		
	0		1	25.1975	-4.4763	21.9549	-4.9811
	2		1	17.8785	-5.6364		
	⋮	...	⋮	⋮	⋮		
	2		0	17.4854	-7.0809	17.6820	-6.3587

Table 3.3 Sample IA point means and their subsequent Marginal Means

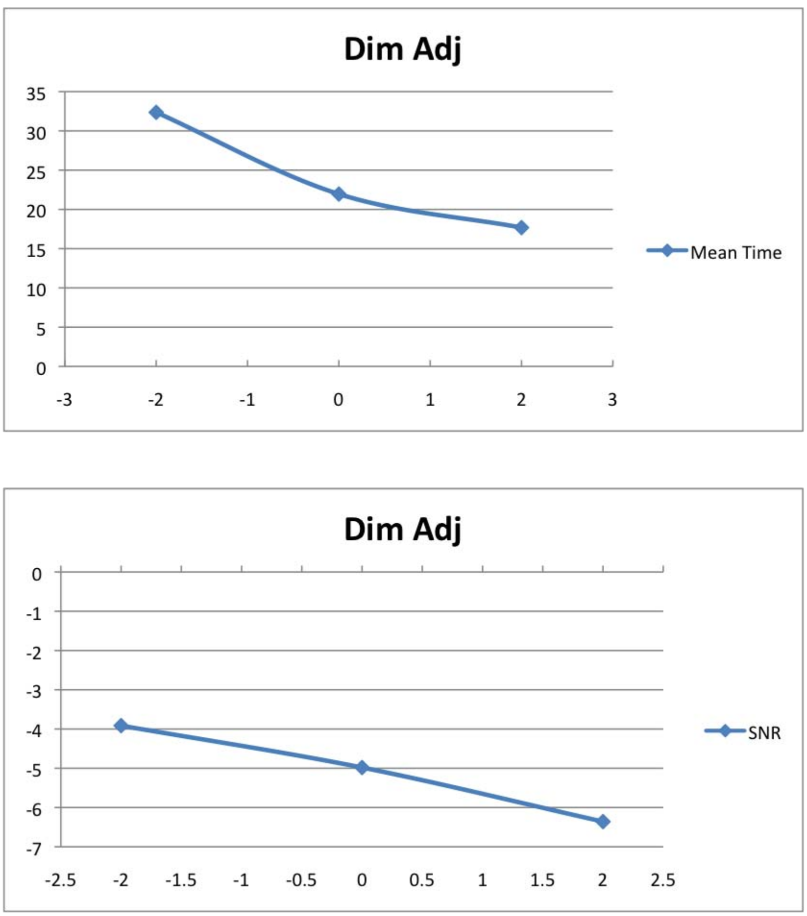


Figure 3.1 Sample Mean and SNR Plots

All that remains is to select control variables that, in our example, minimize time while maximizing SNR. Using the plots in Fig. 3.1, the correct setting is to let *Dim Adj* = 0. This setting provides a trade off between the two competing objectives. While giving up ∼3 seconds from the optimal time, the SNR is improved ∼1.5. Maximizing SNR only improves it's solution by about 1, but has an expected time cost more than 10 seconds higher. Plotting the marginal means helps the analyst visualize the impacts of one setting versus another and make decisions about which control variable settings have the greatest impact on the response.

3.4 Combined Array Method

Recall from Subsection 2.4.2 that the response surface approach has become a widely adopted technique for locating robust parameter settings. Although RSM is widely used for RPD problems, the literature is sparse with regard to problems where the noise parameter(s) are categoric in nature. Brenneman and Myers [2] published a technique in 2003 that will be adapted for use in the AutoGAD problem where the noise variable is defined to be the image of interest. Images are discrete points in the noise space and therefore are easily translated in a single categorical variable.

Recall that eight images are being used, thus each can be thought of as a category of a single noise variable, image. In the real world implementation of the algortihm, the probability of any one image from the infinite population of images that may exist being presented to the algorigthm is essentially zero. However, within this experiment, the population is limited to 8 and each image has an equal chance of being presented to the algorithm at any time.

Just as with the Crossed Array approach, the first step is to develop a test design. Development of this design was also conducted in DX7. Initally, a full factorial design was generated, consisting of ∼16000 runs. These runs became the

Input Parameter	**Classification**	**Designator**
Dimension Adjust	Control	A
Max Score Threshold	Control	B
Bin Width SNR	Control	C
PT SNR Threshold	Control	D
Bin Width Indentify	Control	E
Smooth Iterations High	Control	F
Smooth Iterations Low	Control	G
Low SNR	Control	H
Window Size	Control	J
Threshold Both Sides	Control	K
Clean Signal	Control	L
Image	Noise	M

Table 3.4 Control and Noise Factor Designators

solution space for DX7's D-Optimal Design algorithm. This algorithm first selects a minimum number of runs needed to approximate a user-specified model complexity. As described earlier, a 2-factor interaction model was specified. The algorithm selects the appropriate number of runs from the solution space and then by substitution, seeks to minimize the determinant of the coded factor matrix generated by the currently selected runs. An initial design of 174 runs was suggested by the software, however in order to better estimate quadratic effects, the design was augmented with 32 center-point runs for a total of 206 runs.

The first phase of analysis for the RSM approach is develop a response model using standard Analysis of Variance (ANOVA) techniques. In this case, ANOVA was accomplished using backward stepwise regression on a second order full factorial model with an $\alpha = 0.1$. Once again, the analysis process will be illustrated using the time response. For conciseness and clarity during analysis, each control and noise variable was assigned a letter designator for use in equations. Table 3.4 maps each variable to it's assigned letter.

Backward stepwise regression ANOVA was performed on the 206 time responses and their corresponding control variables. A Box-Cox test was conducted

on the initial model. The results of the Box-Cox suggested the data be transformed using an inverse square transformation. Eq. 3.2 gives the transformation where x is the raw response data and y is the transformed response.

$$y = \frac{1}{x^2} \tag{3.2}$$

After transforming the data, ANOVA was again used to generate a potential model. The resultant ANOVA table is shown in Table 3.5.

This analysis provided a better fitting model than the raw data ANOVA. The adjusted R^2 for this model was .78372. The equation for the transformed time model is given in Eq. 3.3.

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Value	p-value Prob < F
Model	3.698975258	47	0.078701601	16.8048762	< 0.0001
A	0.328445766	1	0.328445766	70.13186954	< 0.0001
B	0.007349487	1	0.007349487	1.56931005	0.2122
C	0.001340472	1	0.001340472	0.286226338	0.5934
D	0.000242661	1	0.000242661	0.051814559	0.8202
G	0.000322735	1	0.000322735	0.068912395	0.7933
H	0.024956423	1	0.024956423	5.328857211	0.0223
J	5.36656E-05	1	5.36656E-05	0.011459036	0.9149
K	0.003996599	1	0.003996599	0.853379639	0.3570
L	0.116145608	1	0.116145608	24.80016322	< 0.0001
M	2.362236712	7	0.337462387	72.05715708	< 0.0001
AG	0.023995272	1	0.023995272	5.123626024	0.0250
AM	0.27178284	7	0.03882612	8.290404882	< 0.0001
BC	0.044829954	1	0.044829954	9.57238256	0.0023
BK	0.014034979	1	0.014034979	2.996839694	0.0854
BL	0.073198798	1	0.073198798	15.62988193	0.0001
CH	0.011877226	1	0.011877226	2.53610232	0.1133
CK	0.01527487	1	0.01527487	3.261589385	0.0728
DG	0.026201225	1	0.026201225	5.59465546	0.0192
DJ	0.02874754	1	0.02874754	6.138361227	0.0143
GK	0.01841259	1	0.01841259	3.931575534	0.0491
HM	0.08947022	7	0.01278146	2.729180214	0.0106
LM	0.163885904	7	0.023412272	4.999140129	< 0.0001
G^2	0.028935945	1	0.028935945	6.178590651	0.0140
Residual	0.739955049	158	0.00468326		
Lack of Fit	0.715930196	151	0.00474126	1.381436854	0.3481
Pure Error	0.024024853	7	0.003432122		
Corr Total	4.438930307	205			

Table 3.5 ANOVA for Time Response

$$
\begin{aligned}
\textbf{Time}^{-2} = {} & 0.095959953 - 0.049083154 \times A + 0.008216574 \times B \\
& + 0.004174205 \times C + 0.002180937 \times D + 0.000517243 \times G - 0.014463039 \times H \\
& + 0.000586791 \times J + 0.005116137 \times K - 0.024563611 \times L \\
& - 0.05387493 \times M[1] - 0.088532213 \times M[2] + 0.257884684 \times M[3] \\
& + 0.024603022 \times M[4] + 0.004100322 \times M[5] - 0.121417776 \times M[6] \\
& - 0.068272658 \times M[7] - 0.013658435 \times AG + 0.02726298 \times AM[1] \\
& + 0.043139191 \times AM[2] - 0.108957117 \times AM[3] + 0.026570975 \times AM[4] \\
& + 0.000394792 \times AM[5] + 0.033802758 \times AM[6] - 0.012433922 \times AM[7] \\
& - 0.018644844 \times BC - 0.010028052 \times BK + 0.023304115 \times BL \\
& - 0.010093548 \times CH - 0.010361026 \times CK + 0.014214098 \times DG \\
& + 0.01556147 \times DJ - 0.012026222 \times GK + 0.011086521 \times HM[1] \\
& + 0.017455334 \times HM[2] - 0.062479388 \times HM[3] + 0.017475338 \times HM[4] \\
& + 0.023545491 \times HM[5] - 0.01122123 \times HM[6] + 0.005579995 \times HM[7] \\
& - 0.007668634 \times LM[1] + 0.013823052 \times LM[2] - 0.008619933 \times LM[3] \\
& + 0.051810785 \times LM[4] - 0.031730238 \times LM[5] + 0.019003705 \times LM[6] \\
& + 0.01267563 \times LM[7] + 0.03056574 \times G^2, \qquad (3.3)
\end{aligned}
$$

Notice that each time the noise variable, M, occurs it is represented with seven different coefficients and variable representations ($M[1]...M[7]$). This notation is a result of the dummy variable structure developed in Eq. 2.12 where each category of the noise is represented as a 1 or 0 in the equation. When the image M equals the first category, $M[1] = 1$ and all other M's are zero. The eighth category is the baseline where $M[1]$ through $M[7]$ are all set to zero. This structure allows the model to more accurately predict the response from each category of the noise space, since those categories are not continuous or even ordinal in nature.

3.4.1 Mean Model

Now that a model for predicting the time response has been developed, the technique suggested by Brenneman and Myers [2] will be adapted to create mean response. Utilizing the dummy variable structure developed in Eq. 2.12, along with the expected value for multinomial distributions, $E(y) = \sum_i p_i y_i$, the general model for estimated mean response across the entire noise space is:

$$
\begin{aligned}
\widehat{E_z}[y(\mathbf{x},\mathbf{z})] = {} & p_1\hat{y}(\mathbf{x}, z_1 = 1, z_2 = 0, z_3 = 0, z_4 = 0, z_5 = 0, z_6 = 0, z_7 = 0) \\
& + p_2\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 1, z_3 = 0, z_4 = 0, z_5 = 0, z_6 = 0, z_7 = 0) \\
& + p_3\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 1, z_4 = 0, z_5 = 0, z_6 = 0, z_7 = 0) \\
& + p_4\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 0, z_4 = 1, z_5 = 0, z_6 = 0, z_7 = 0) \\
& + p_5\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 0, z_4 = 0, z_5 = 1, z_6 = 0, z_7 = 0) \\
& + p_6\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 0, z_4 = 0, z_5 = 0, z_6 = 1, z_7 = 0) \\
& + p_7\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 0, z_4 = 0, z_5 = 0, z_6 = 0, z_7 = 1) \\
& + p_8\hat{y}(\mathbf{x}, z_1 = 0, z_2 = 0, z_3 = 0, z_4 = 0, z_5 = 0, z_6 = 0, z_7 = 0), \qquad (3.4)
\end{aligned}
$$

where $p_1 \ldots p_8 = \frac{1}{8}$ for noise categories with equal probability of occurrence. However, when developing a model for the mean time response from the observed data the probability of occurrence for each category is easily calculated by dividing the number of times each image was used by the total number of runs. The probabilities of occurrence for each category are given in Table 3.6.

Noise Category	**Occurence Probability**
M[1]	0.121359223
M[2]	0.126213592
M[3]	0.13592233
M[4]	0.121359223
M[5]	0.126213592
M[6]	0.116504854
M[7]	0.121359223
M[8]	0.131067961

Table 3.6 Observed Probability of Occurrence for Noise Categories

Plugging the probabilities from Table 3.6 into Eq. 3.4 and combining the terms results in the reduced estimated mean model given in Eq. 3.5.

$$
\begin{aligned}
\widehat{E_z}[y(\mathbf{x},\mathbf{z})] = {} & 0.094372095 \\
& - 0.049435818 \times A \\
& + 0.008216574 \times B \\
& + 0.004174205 \times C \\
& + 0.002180937 \times D \\
& + 0.000517243 \times G \\
& - 0.01494442 \times H \\
& + 0.000586791 \times J \\
& + 0.027060476 \times K \\
& + 0.011679743 \times L \\
& - 0.013658435 \times AG \\
& - 0.018644844 \times BC \\
& - 0.010028052 \times BK \\
& + 0.023304115 \times BL \\
& - 0.010093548 \times CH \\
& - 0.010361026 \times CK \\
& + 0.014214098 \times DG \\
& + 0.01556147 \times DJ \\
& - 0.012026222 \times GK
\end{aligned}
$$

Since each of the categorical noise variables in Eq. 3.3 are assigned a value of 1 or 0 during this step, the noise factor interaction terms can be reduced to a single term where the marginal probability for each noise category is multiplied by the coefficient of it's corresponding control×noise interaction term and the resultant coefficients are summed along with the coefficient for the control variable to yield a single coefficient for the control term. This idea is illustrated in Eq. 3.6 where Γ is the sum of all the coefficients and each M is evaluated as 1. Each of the coefficients for the interaction terms results from multiplying the adjustment coefficient for each interaction term found in Eq. 3.3 by the appropriate occurrence probability from Table 3.6.

$$\begin{aligned}
\Gamma \times A = & -0.049083154 \times A \\
& + 0.003308614 \times AM[1] \\
& + 0.005444752 \times AM[2] \\
& - 0.014809705 \times AM[3] \\
& + 0.003224633 \times AM[4] \\
& + 4.98281 * 10^{-05} \times AM[5] \\
& + 0.003938185 \times AM[6] \\
& - 0.001508971 \times AM[7]
\end{aligned} \tag{3.6}$$

3.4.2 Variance Model

Now that a mean model has been generated, the variance model follows directly from Eq. 2.9. This version of the variance model is used since the noise is categorical and the p_i's are known, so the variance-covariance matrix is fully characterized and its components are easily substituted into equation. The estimated variance model is:

$$
\begin{aligned}
\widehat{\text{Var}_z}\left[y(\mathbf{x},\mathbf{z})\right] = &\sum_i \left[(\gamma_i + \mathbf{x}\Delta_i)^2 \text{Var}(z_i)\right] \\
&+ 2\sum\sum_{i \neq j} \left[(\gamma_i + \mathbf{x}\Delta_i)(\gamma_j + \mathbf{x}\Delta_j)\text{Cov}(z_i, z_j)\right] \\
&+ \sigma^2
\end{aligned}
\tag{3.7}
$$

where $\text{Var}(z_i) = p_i(1 - p_i)$ and $\text{Cov}(z_i, z_j) = -p_i p_j$. Recall that γ is a vector of main effect coefficients which in the case of variance is only the coefficient of the noise main effect. Additionally, Δ is a matrix of control-by-noise interaction coefficients. Therefore, the coefficients in Eq. 3.5 provide all the elements of both γ and Δ. The remaining term, σ^2, is simply the Mean Square Error (MSE) or Residual of the ANOVA model. The coefficients of the variance model in Eq. 3.7 are thus computable and the constant terms are known, so all that remains is to determine control variable levels that minimize the estimated variance. Due to the large number of terms in this model (over 200), it will not be given here. However, the Excel™ spreadsheet used for the step by step analysis is included in App. B

Once both the mean and variance models are built, Brenneman and Myers [2] suggest first minimizing the variance first by adjusting the control factors that interact with the noise. This problem is notionally expressed in Eq. 3.8.

$$
\begin{aligned}
&\textbf{min } \widehat{\text{Var}_z}\left[y(\mathbf{x},\mathbf{z})\right] \\
&\quad \text{s.t.} \qquad \text{Dispersion Controls within range of Designed Experiment}
\end{aligned}
\tag{3.8}
$$

The levels for the dispersion factors solved for in Eq. 3.8 are then inserted into Eq. 3.5 and the remaining adjustment control factors are used to bring the estimated mean response up, down, or on target. All significant controls as determined by the

Response	Transformation	Adjusted $\mathbf{R}^2$
Time	$y = \text{Time}^{-2}$	0.7837
True Positive Fraction	$y = \ln \frac{\text{TPF}+80}{1.001-1}$	0.9679
False Positive Fraction	$y = (\text{FPF} + 0.001)^{-1}$	0.7730
Target Fraction Percent	$y = \sqrt{\text{TFP} + 0.01}$	0.6466

Table 3.7 Transformations and Resultant Adjusted R^2's

ANOVA in Table 3.5 have now been assigned values resulting in minimized response variance and optimized response performance (min, max, target).

3.5 Reducing Multiple Responses to a Single Dimension

Recall from section 3.2 that there are four responses of interest. These responses measure different aspects of AutoGAD performance that can be used in aggregate to quantify overall algorithm performance. Initial analysis efforts using four independent responses proved problematic, especially within the Combined Array approach.

First, the ANOVA models generated for each of the responses fit the data poorly, and as noted in section 3.4, the models failed Box-Cox goodness of fit tests. DX7 provided suggested transformations along with the results of the Box-Cox test. After transforming the data for each response according to suggestions, the resultant models were better, but not sufficient. Table 3.7 provides the transformation performed along with the adjusted R^2's for each transformed response's model.

Secondly, when the transformed response models were used to produce mean response and expected variance models according to technique described in subsections 3.4.1 and 3.4.2, these models were poorly behaved. The initial minimization of the expected variance model suggested control settings within the ranges observed

during testing, but the generated responses often appeared improbable, although technically feasible. Further, when the dispersion factor values were inserted into the mean response model, no feasible solution could be found. Adjustment factor values located on the ranges observed during the course of the designed experiment did not produce feasible response values. Thus, when adjustment factor values were forced onto the observed range, the resultant mean response was infeasible (*e.g.* negative time values, TPF$\gg$1).

Section 3.2 suggests the true measure of performance for AutoGAD is how accurately the algorithm identifies potential targets within a scene. Quantifying this performance resulted in the four responses listed in Table 3.2. However, the difficulties detailed above precluded further analysis of individual responses. Therefore, some simplification of the responses was necessary in order to complete the analysis and locate robust parameter settings.

The most intuitive simplification technique is to reduce the dimensionality of the responses. This is most easily accomplished by developing some function where the responses listed in Table 3.2 are linearly combined in some fashion resulting in a single response.

There are two issues that must be dealt with in order to make evaluation of this function valid. First, the units of the response data must be either uniform or removed. Secondly, the scale of each response must be uniform. The outlier in both regards is the time response. While the three other responses are essentially percentages and can only exist on the $[0, 1]$ interval, the time response is reported in seconds and could theoretically be of infinite size.

A relatively simple and common transformation performed in multivariate analysis is data standardization [3]. This process begins by computing the sample mean and variance for each response. Next, the sample mean for each respective response is subtracted from each data point in the sample. This effectively centers each responses data around its sample mean. The sample mean for this adjusted

data, known as mean corrected data, is zero. Finally, each mean corrected data point is divided by the square root of its respective sample variance. This step scales the data so that each observation is now expressed in terms of standard deviations from the corrected mean of zero. So, if the data is approximately normally distributed, one would expect that ∼67% of the data points would be on the interval $[-1, 1]$. Letting $\hat{x}_i$ represent the standardized form of x_i, the entire standardization process is expressed in a single step in Eq. 3.9.

$$\hat{x}_i = \frac{x_i - \bar{x}}{\sqrt{s^2}} \tag{3.9}$$

Standardizing the data solves both the unit and scale problems discussed above. The standardized data is unitless since the units in the numerator are divided by the square root of squared units in the denominator. The scale of standardized data is now in terms of standard deviations for all four responses. Each standard deviation is computed using data from a single response, so it scales its respective data according to the variance of the underlying distribution from which the data comes.

The final step before the response terms can be combined is to determine the influence each individual response will have on the combined response. This influence is easily quantified using a weighting coefficient for each response. The size of the weightings is arbitrary, but it is common to select them such that they sum to one. Doing so allows each weighting coefficient to be intuitively translated into a percentage that each response will contribute to the combined response. These weights are commonly assigned by a process decision maker. For instance, in the case of AutoGAD, the analyst responsible for interpreting the output from AutoGAD would be the decision maker. As such, they would assign weights to each of the four responses according to their individual preferences for speed, accuracy, false alarm

rate, or some combination thereof. For the analysis here, each of the four responses will be assigned an equal weight coefficient of 1. This will give equal importance to each in determining the combined response value from a particular combination of parameter settings.

Generating the objective function is now a straightforward matter, however care must be taken to ensure each response contributes to the function in the proper direction. Considering each of the four responses independently, the sign their respective terms carry into the objective function is determined. Before this can begin the objective function type is determined and subsequently determines the sign for each of its contributing responses. Maximizing the objective function is intuitive for optimizing a target detection algorithm and thus will be used here.

The first response under consideration is the time response which is optimized by minimizing the run time of the algorithm and delivering solutions to the user as quickly as possible. Therefore, the time term in the objective function should have a negative sign so that as the time response grows smaller the objective function experiences smaller penalties from the observed time response. Recall the time responses have been standardized, so the smallest times will enter the objective function as negative values since they are smaller than the mean which was shifted to zero. Subtracting this already negative value effectively adds it thereby maximizing the resultant objective function value.

Next is the true positive fraction response. Since this response is optimized at its maximum value of one, adding its term within the objective function further increases the objective function's value. Standardizing the TPF data has a similar but opposite effect to what was observed in the time response. Since the largest TPF values are most desirable, they are larger than the standardized mean response of zero and will therefore be positive. Adding this positive value has the desired effect on the objective function value.

The third response considered is false positive fraction. This response is optimized at its minimum value of zero. Thus, its standardized term within the objective function is treated in the same manner as the time response term. Its optimal standardized value is below the mean and therefore negative. Once again, by subtracting this negative value it is effectively added and the objective function value increases accordingly.

The final response considered is target fraction percent. This response behaves like TPF and is optimized at its maximum value of one. The optimal standardized TFP response is greater than its standardized mean and thus positive. Therefore, like TPF its term is added within the objective function and serves to further maximize the objective function value.

All four responses are now sufficiently prepared such that they can be combined into a single objective function. This function is mathematically expressed in general form in Eq. 3.10 where $\widehat{O}$ represents the objective function's response value and $\widehat{\mathrm{x}}$ represents the standardized individual responses. Maximizing this one dimensional response will drive the individual responses toward their respective optimality values.

$$\mathbf{max}\ \widehat{O} = -\left[1 \times \widehat{\mathrm{Time}}\right] + \left[1 \times \widehat{\mathrm{TPF}}\right] - \left[1 \times \widehat{\mathrm{FPF}}\right] + \left[1 \times \widehat{\mathrm{TFP}}\right] \tag{3.10}$$

Creating this new one dimensional response for each point in the design space generates a new data set that can be analyzed in exactly the same manner as the original responses. Within the Combined Array approach detailed in Section 3.4, ANOVA can be performed to generate a predictive model. Analysis of the resultant model to generate models for expected mean response and expected variance is performed in exactly the same manner. The subsequent determination of control variable settings is also accomplished according to the methods previously discussed.

While the Crossed Array approach did not necessarily exhibit the same severe pathology during initial analysis of the individual responses, similar dimensionality reduction was conducted for the sake of consistency. Recall from Section 3.3, $\bar{y}$'s and SNR's were computed for each response at each of the 280 design points in the IA. The 2240 responses were standardized using Eq. 3.9 prior to computing $\bar{y}$'s and SNR's for each of the 280 IA design points. The objective function for combining the $\widehat{\bar{y}}$'s accordingly uses the procedure detailed above for determining the signs of each response's term within the objective function. So, the standardized single dimension objective value is computed using Eq. 3.11.

$$\textbf{max } \widehat{\bar{y}} = -\widehat{\bar{y}_{\text{Time}}} + \widehat{\bar{y}_{\text{TPF}}} - \widehat{\bar{y}_{\text{FPF}}} + \widehat{\bar{y}_{\text{TFP}}} \tag{3.11}$$

SNR's are already unitless and scaled by the sample variance according to Eq. 2.6, thus they do not require standardization. Additionally, regardless of the optimal value of the response that produced a particular SNR, it is optimized by maximization. Thus, the objective function for the combined SNR's is simply a sum as shown in Eq. 3.12.

$$\textbf{max } \text{SNR}_{\text{Total}} = \text{SNR}_{\text{Time}} + \text{SNR}_{\text{TPF}} + \text{SNR}_{\text{FPF}} + \text{SNR}_{\text{TFP}} \tag{3.12}$$

4. Analysis of Results

This chapter provides detailed analysis of experimental results from two separate RPD techniques. The analysis methodology employed within each technique is detailed in Chapter 3.

All experimental AutoGAD runs for both methodologies were conducted on a Dell Precision™ 490 PC with a 3.0 GHz Intel® Xeon® 5160 with 3.0 GB of RAM running Windows™ XP SP3. The performance data was collected and recorded during the run execution, but the computation time for data collection did not contribute to the per run algorithm performance time.

4.1 Analysis of the Crossed Array

Within this section the results of the Crossed Array analysis are presented in keeping with the steps of the analysis procedure detailed in Section 3.3. Recall from Table 3.1 there are 11 control variables and the inner array is a 70 run CCD_V replicated four times yielding 280 design points on the inner array. The control variable levels for each design point can be found along with their corresponding raw responses in Tables A.1 through A.8 in App. A.

The rows in each of the eight tables correspond to each other, meaning the control variable levels in row one of A.1 are exactly the same as the levels found in row one of the other seven tables. This set of rows make up the design points in the outer array of the experimental design. The data in all of the tables are first standardized with respect to the set of all 2240 points. These standardized responses across the eight matching rows of the tables can be averaged to find a mean standardized response across the noise space. Doing so for each of the 2240 data points captured by the tables referenced above reduces the data to 280 points, one mean response for each inner array design point. The overall mean and variance of these 280 mean responses is now easily computed and used to produce a SNR for

each point. The SNR's were computed using Eq. 2.6 and are provided along with the mean responses for each of the 4 algorithm outputs in Table A.9 in App. A.

The data for mean response is now a set of 280, four dimensional vectors where each dimension represents one of the four responses of interest. At this point, the dimensionality reduction process detailed in section 3.5 was used to reduce the four dimensional response data to a single response according to Eq. 3.11. The individual response SNR's were also combined using Eq. 3.12. Both of these new one dimensional data sets are provide in Table 4.1.

The next step in the crossed array analysis is to compute the marginal means for each of the levels of the control variables. This is easily done by concatenating the data in Table 4.1 with the levels of the control variable of interest and then resorting the new table by the control variable column. Now the response data is grouped by control variable level and the mean of each group is easily computed. Repeatedly resorting the data using a new control variable for each iteration produces marginal mean responses for each level of the control variables. These marginal means are shown in Table 4.2.

The marginal means for each control variable can now be plotted, vizualizing the relationship between the response and the control of interest. This visualization communicates more clearly the control$\times$response relationship and assists in the pick-the-winner analysis. The marginal means of the SNR's are also plotted to assist in selecting control variable settings that maximize SNR, thereby minimizing response variance. The mean response and SNR plots for each control variables are given in Figures 4.1 through 4.11.

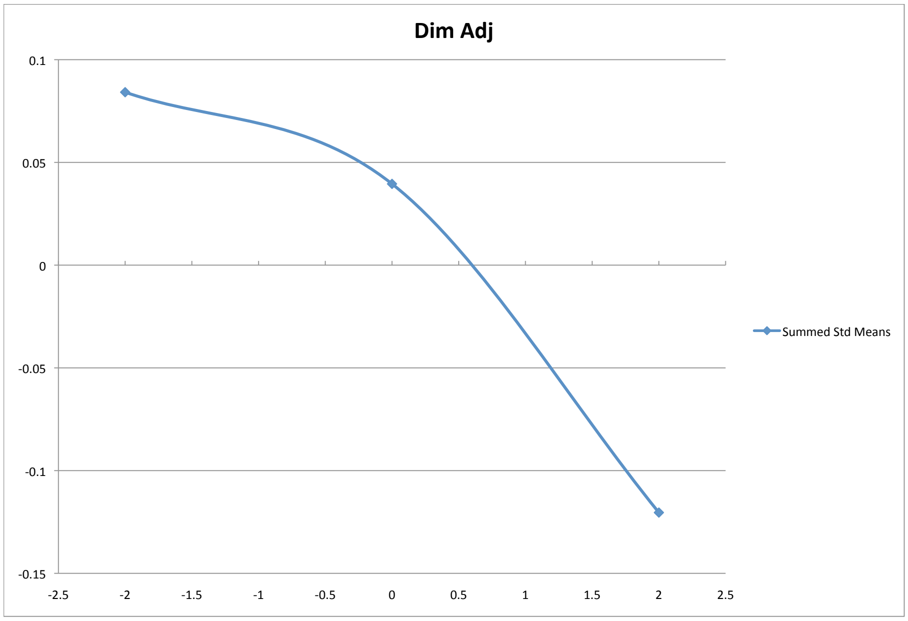
Now that the marginal means for mean response have been computed and plotted, decisions must be made about which control variables will be used to bring the mean responses to target (maximize the objective function of standardized responses) and which will be used to maximize SNR, or minimize response variance. Even though Myers and Montgomery suggest simultaneous mean response and SNR

Run	Summed Std Means	Summed SNRs	Run	Summed Std Means	Summed SNRs	Run	Summed Std Means	Summed SNRs	Run	Summed Std Means	Summed SNRs
1	0.167490866	-68.68018497	71	0.359452577	-81.88113504	141	-0.385459391	-46.97569487	211	-1.532958652	-36.96910486
2	0.43247392	-50.86710022	72	-1.661642317	-61.44823209	142	0.209096854	-75.97631302	212	-0.102495347	-76.04069189
3	-1.475964427	-59.98940148	73	0.32693422	-52.08113201	143	-0.302678613	-17.18930107	213	1.340071013	-11.01833206
4	-0.423155471	-84.22641974	74	0.0427316	-56.61957211	144	-0.152829872	-45.37047022	214	-0.153078555	-24.93500636
5	-0.865821793	-10.36401404	75	-1.002863973	-14.01865182	145	0.431961998	-26.16829706	215	0.520655319	-63.02692864
6	0.126705182	-3.223114945	76	0.438638627	-33.95417154	146	1.299145213	-17.18573367	216	-1.687966101	-46.59987214
7	-1.272567142	-13.43290864	77	0.713783529	-65.43198514	147	0.43316236	-42.43600742	217	-1.000577247	-16.22445876
8	-0.714242327	-98.7758339	78	-0.244732452	-69.25729349	148	-0.61081448	-32.73280375	218	-0.375403449	-39.26444577
9	-1.291217747	-58.10549898	79	-0.624597314	-96.78771938	149	1.261690126	-24.91917975	219	-0.341098518	-40.28433249
10	-1.274876887	-54.57572264	80	-1.056185006	-17.07356802	150	1.419376282	-13.25579461	220	-0.223952141	-37.5735844
11	-1.006905912	-24.02089928	81	0.32380038	-60.94340843	151	0.304531447	-77.78593462	221	-0.558900537	-56.2106208
12	-0.851549321	-56.75485408	82	-0.185354477	-54.34484069	152	-0.10540833	-95.60106157	222	-0.557999836	-39.12564767
13	-0.912438743	-41.09795254	83	-0.098622674	-70.25234981	153	1.183658451	-13.54710196	223	0.253377141	-17.97947887
14	0.449198801	-51.46450153	84	-2.228668894	-32.24705654	154	-1.057064769	-58.75612591	224	-0.114738627	-8.82892657
15	-2.175993877	2.944451956	85	0.340187769	-48.6304648	155	-0.976049812	-56.81684434	225	0.956554974	-40.9361939
16	-1.095284684	-39.29791692	86	-0.384062466	-37.99870654	156	-0.369337933	-28.83477028	226	-0.670952719	-90.37779174
17	1.240612211	-29.53434677	87	0.420146843	-36.1979395	157	1.264568368	-14.85721767	227	-0.035507283	-82.40650367
18	1.350029394	-10.05942784	88	0.538258943	-59.335434	158	0.665277985	-13.63596233	228	0.399853396	-74.10523174
19	0.733173894	-8.096842112	89	-1.142762916	-82.94635351	159	1.081265636	-53.13627276	229	1.070885976	-22.37624356
20	-0.571347987	-84.78819564	90	-0.84115702	-52.80578911	160	-1.03422301	-82.94634892	230	0.697256224	-17.1412427
21	-0.332759344	22.32023837	91	1.340027011	0.287876096	161	1.615038987	3.506423736	231	0.466620308	-40.55979132
22	-0.081374223	-90.76581322	92	-0.136808333	-43.94703371	162	-0.552805961	-84.29619592	232	0.640615481	-30.57712292
23	-1.607715837	-51.14304535	93	1.021360223	-39.89002439	163	-0.715617092	-60.38231894	233	0.329359401	-80.85220783
24	-1.022453579	-47.60222078	94	-1.098908671	-62.4194094	164	0.16830093	-44.3861619	234	0.706177565	-41.10965615
25	-0.387085691	-42.8104341	95	1.036657717	-2.625243637	165	-0.900101746	-47.32202306	235	0.093214258	-80.53802792
26	-0.384777651	-63.3248773	96	0.154507146	-58.50844089	166	0.766711878	-36.31927661	236	1.051381382	-7.997924567
27	1.379649609	-22.134268	97	-0.454408826	-70.91850658	167	1.642870623	19.97218516	237	0.320006671	-64.23641949
28	0.440512198	-44.36181812	98	1.274210429	-8.908705297	168	1.203984752	-12.27822147	238	-0.75372455	-31.33641369
29	0.132054507	-52.25641604	99	0.767088053	-66.45824768	169	1.138335886	-20.7675684	239	0.062513719	-2.450860459
30	-0.944833397	-85.08825777	100	-1.207177063	-46.30125196	170	1.787933024	27.08410726	240	1.179932221	-32.12133117
31	1.581393501	0.246975404	101	0.5195634	-34.00998834	171	-0.047131523	-84.798662	241	0.114156052	-29.05245416
32	0.399114324	-56.72203174	102	0.280995113	-111.4060113	172	-0.016963111	-66.53949982	242	-0.315280215	-68.58478092
33	-1.049830944	-68.05572052	103	-0.451486239	-58.4529208	173	0.365169056	-44.90442186	243	0.371308299	-51.22554132
34	-0.424298216	2.438586625	104	-0.864721568	-51.37522778	174	-1.28313677	-34.85911905	244	-1.565265524	-35.18902039
35	0.948007309	-33.96070283	105	-0.074898286	-25.37320739	175	0.164930804	-48.23276754	245	0.627729123	-39.40945214
36	0.528468709	-39.58130512	106	-0.930433857	-70.88099462	176	-1.469773527	-70.02972027	246	0.451675349	-57.09866882
37	1.55344953	-13.46801799	107	-0.120175751	-94.79505576	177	-0.529098278	-74.52789903	247	-0.619416669	-32.34973289
38	1.422072939	2.472434771	108	-1.762078101	-41.81118407	178	-0.034626245	-70.15889954	248	0.654098034	-41.68003445
39	0.331647924	-40.76856952	109	-1.135759779	-26.99771377	179	0.064839957	-68.26227597	249	0.362423439	-59.89379431
40	-0.991975371	-38.30978014	110	0.872473861	-60.0306535	180	0.541325356	-39.81398473	250	0.693359928	-30.71830906
41	0.296052248	-19.14627811	111	-0.776548999	-22.44685293	181	0.588986194	-46.41936011	251	1.74111942	-4.267731525
42	-1.191990612	-50.25199615	112	-0.602451391	-78.87270543	182	-0.294577111	-122.966282	252	-0.17354619	-54.41110569
43	-1.153923091	-0.857682591	113	-0.012898977	-73.79352424	183	-0.008812783	-38.77674112	253	0.779343454	-71.72336868
44	-0.228336808	-76.30220916	114	0.546111532	-26.49649566	184	0.820277969	-50.41663634	254	1.511120617	23.73359879
45	-0.590321371	-15.71126846	115	1.233242034	-10.48645859	185	-1.095405636	-43.11666374	255	-0.640618222	-16.63582598
46	0.261285707	-48.9797643	116	1.064664514	-23.00064896	186	0.648967307	-35.10581099	256	0.609708405	-63.75118754
47	0.084302351	-57.40017881	117	-0.311507549	-38.26447445	187	0.266851545	-17.07180848	257	-1.507666632	-50.33349786
48	-1.997048166	-42.1084305	118	0.483964964	-15.91170162	188	0.424617704	-85.9166712	258	-0.599809085	-34.21638406
49	1.924805093	16.62415719	119	0.413390187	-62.30630167	189	-0.185649041	-31.31362475	259	0.558468752	-19.79668572
50	0.157616228	-66.43637686	120	0.002460612	-63.28521761	190	-0.837849279	-37.9526951	260	0.292026698	-37.88334964
51	-0.06074629	-37.09936242	121	1.261322503	-42.40153026	191	-0.185572231	-22.27012747	261	0.824135651	-32.94496958
52	0.273063125	-53.07052003	122	-0.738349171	-35.40871188	192	0.288595622	-54.64127892	262	-1.530472545	-38.20670788
53	-0.50852189	-76.24068583	123	-1.354935639	-67.08000044	193	-2.048558878	-56.16907924	263	1.196301233	14.21760949
54	-0.504834952	-24.95073459	124	-0.634354533	-70.80860799	194	0.142129129	-33.16338036	264	1.83386557	33.56463273
55	-0.350125921	-64.57741508	125	0.442051457	-39.57496328	195	1.439595698	-15.49133982	265	-0.328005752	-83.50305901
56	-0.095054906	-52.94813533	126	-0.662946103	-77.02233759	196	-1.389423248	-29.17588017	266	-0.173303714	-110.2637689
57	0.68039304	-9.318750123	127	0.424369327	-71.91469678	197	-0.536223597	-81.76708224	267	0.799435094	-5.167729317
58	-1.758333257	-28.16890731	128	-0.241906304	-60.2050598	198	0.758260591	-21.26987935	268	-0.077732983	-66.82067371
59	-0.437141551	-86.92790743	129	1.558318477	4.440382217	199	-1.368463836	-65.67214658	269	-1.733105132	-7.524267988
60	-0.756971219	-24.93994675	130	-0.303691598	-66.78725398	200	-0.445590175	-77.3894462	270	-1.179909403	-63.11897869
61	0.102161657	-52.08996107	131	-0.086777646	-61.47511333	201	1.522685516	1.966589232	271	-0.003167298	-97.1230054
62	1.644279586	20.61176811	132	-0.858067555	-39.54561608	202	1.026266858	-32.56352378	272	0.623707695	-24.38408899
63	0.980932764	-38.57692714	133	-0.855351737	-45.49482725	203	-0.724267635	-64.19372213	273	-1.295357602	-57.79203774
64	-0.428001985	-57.98841084	134	0.586952864	-72.090623	204	-0.176009404	-27.31353232	274	0.717202452	-6.031695521
65	0.334685029	-53.02719121	135	0.148901256	-67.81409502	205	-1.451031745	-42.87771641	275	-0.726532496	-32.31194
66	-0.108400001	-67.6993738	136	-0.051319188	-67.21593806	206	1.545815918	9.286474723	276	1.028656355	-56.3533817
67	1.682518632	5.767818855	137	0.174526236	-54.92455577	207	-1.687643208	-38.50560214	277	-0.031963248	-16.00370282
68	0.48946526	-93.64314742	138	0.731909417	-36.46113246	208	1.364430122	2.880584423	278	-0.319270023	-67.39422981
69	0.302990927	-44.85683084	139	0.163945327	-35.53210086	209	0.603135179	-49.79559266	279	1.084173269	1.179483512
70	1.535821388	-3.035088258	140	-0.168564946	-5.534704469	210	-1.195273831	-25.48655465	280	0.408991039	-41.70344649

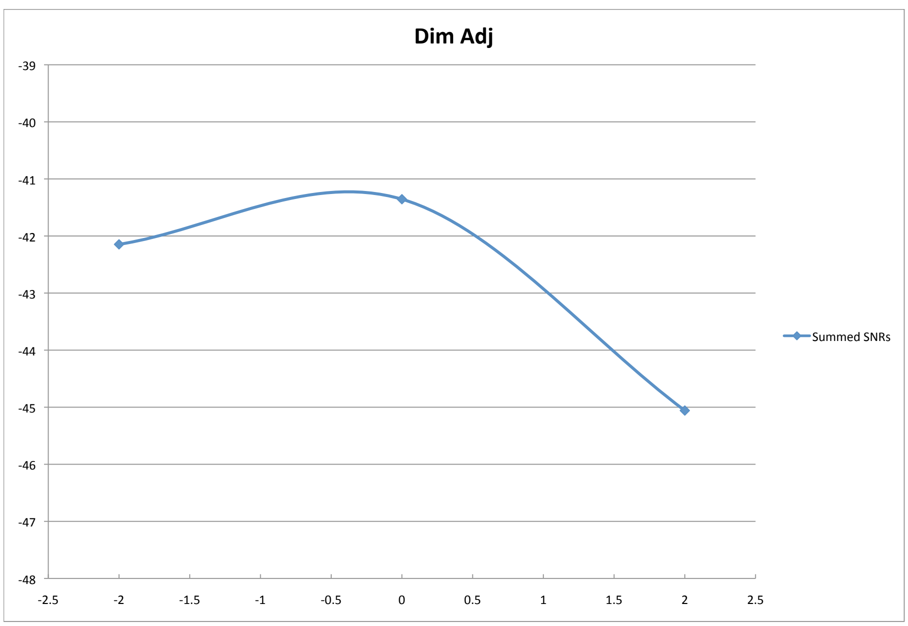
Table 4.1 One Dimensional Standardized Mean Responses and SNR's

		Summed Std Means	Summed SNR's
Dim Adj	-2	0.084166467	-42.14639153
	0	0.039545297	-41.35544867
	2	-0.120416323	-45.05818494
Max Score	6	0.05696234	-39.66950536
	10	-0.022745204	-41.7971879
	14	-0.036112569	-47.13014347
Bin width SNR	0.01	-0.003171626	-42.81204913
	0.055	0.002178575	-41.64158433
	0.1	0.001174598	-44.13023631
PT SNR thresh	1	-0.031688919	-41.60877376
	3.5	0.025029559	-42.04400436
	6	0.008745156	-44.96462666
Bin Width Ident	0.01	-0.09418153	-46.42787791
	0.055	0.016373906	-39.86301966
	0.1	0.079172116	-42.14475848
Smooth iter hi	50	0.05862537	-45.65963224
	100	0.003129879	-41.31670285
	150	-0.061494426	-41.58046122
Smooth iter lo	5	-0.013080957	-43.73116596
	25	0.056707338	-40.82480755
	45	-0.038900769	-43.95983153
Low SNR	4	0.045094616	-43.01592808
	9	-0.041447699	-41.99885998
	14	-0.007100891	-43.59885468
Window Size	1	-0.010374623	-43.0572426
	5	0.017245359	-41.03432788
	9	-0.005433623	-44.44169459
Threshold Both Sides	0	0.007724825	-44.80122353
	1	-0.007724825	-40.99105378
Clean Signal	0	-0.090871599	-44.98163628
	1	0.090871599	-40.81064103

Table 4.2 Marginal Mean Responses for all Conrol Variable Levels



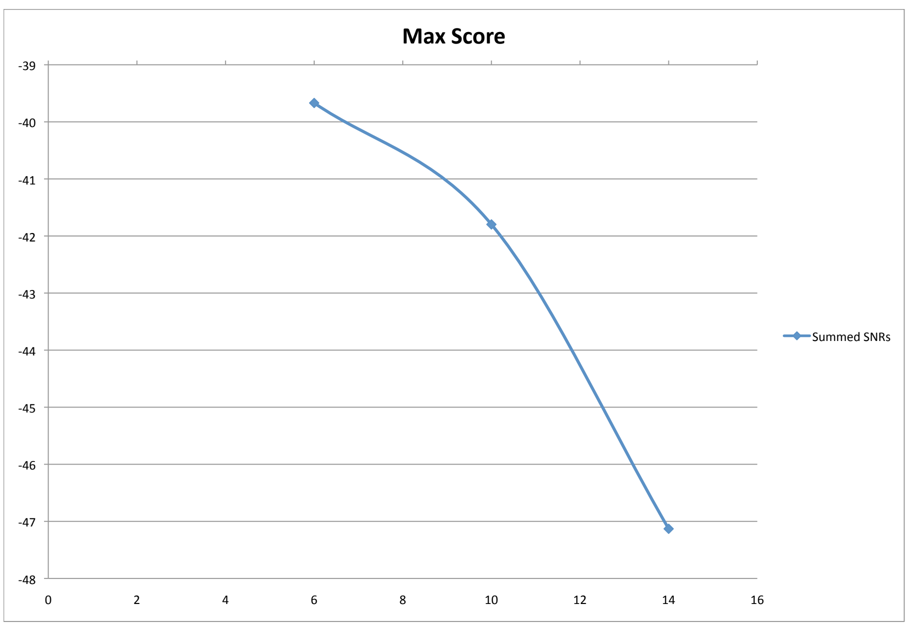
(a) Dimension Adjust vs. Mean Response



(b) Dimension Adjust vs. SNR

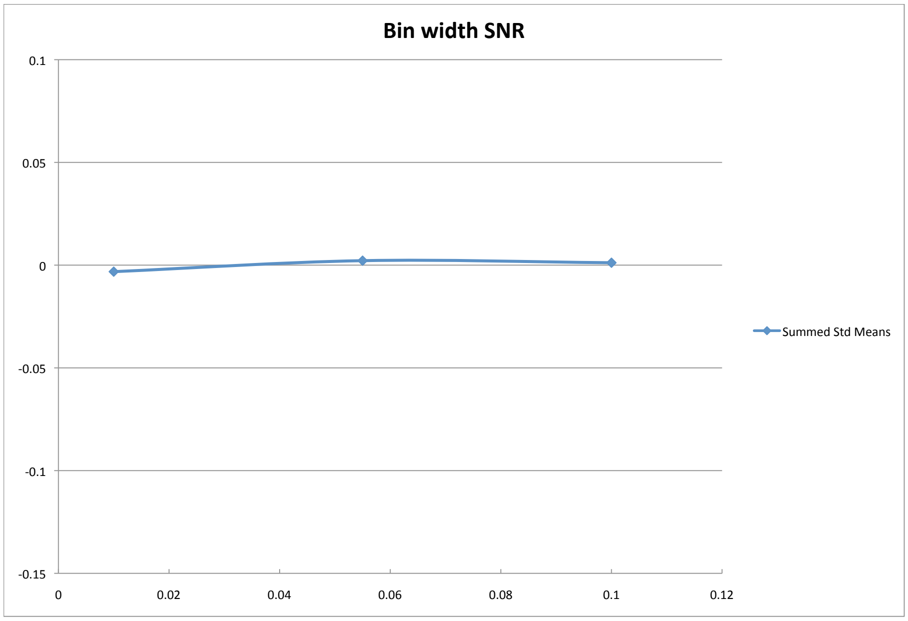
Figure 4.1 Dimension Adjust vs. Marginal Means of Mean Response and SNR

(a) Max Score vs. Mean Response

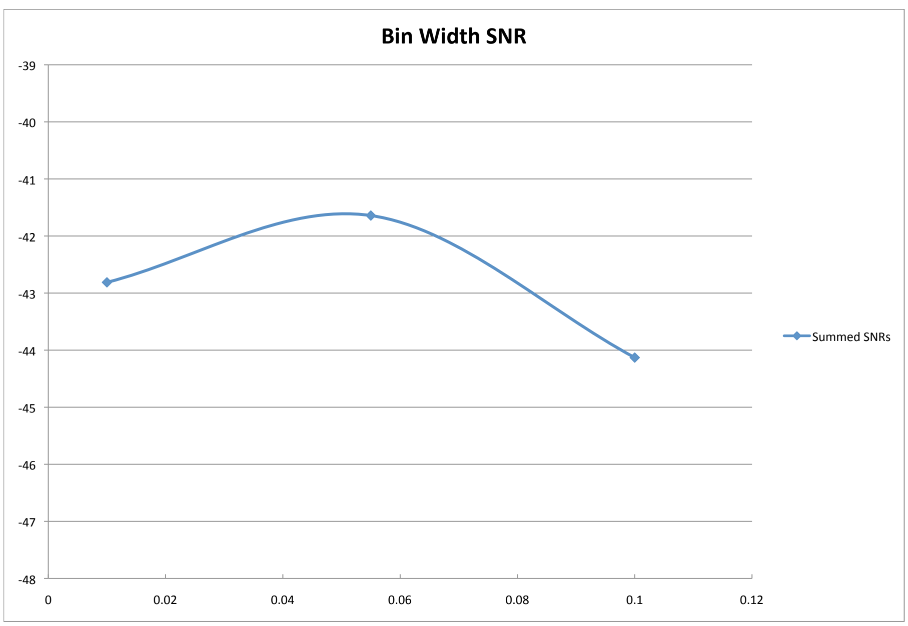


(b) Max Score vs. SNR

Figure 4.2 Max Score vs. Marginal Means of Mean Response and SNR

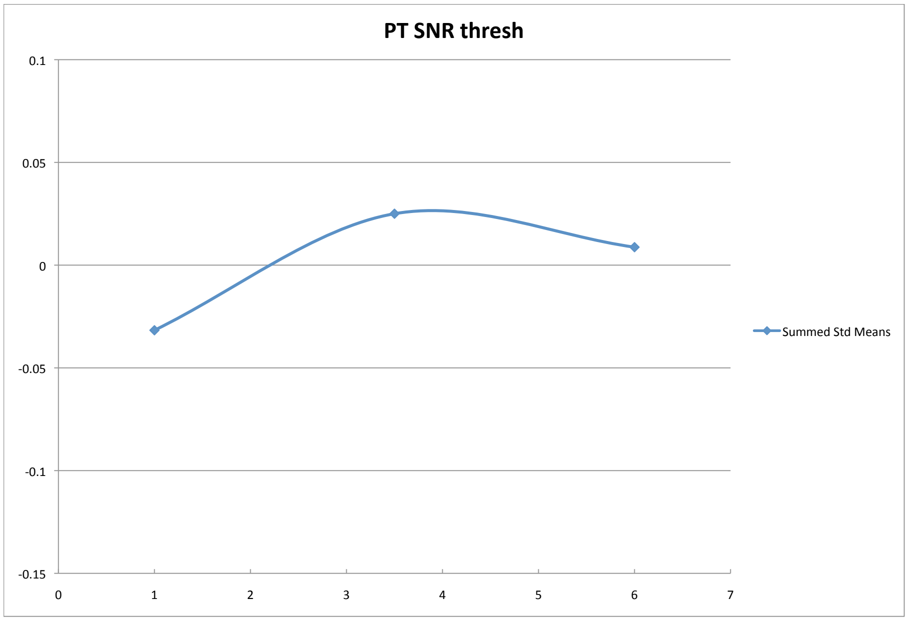


(a) Bin Width SNR vs. Mean Response

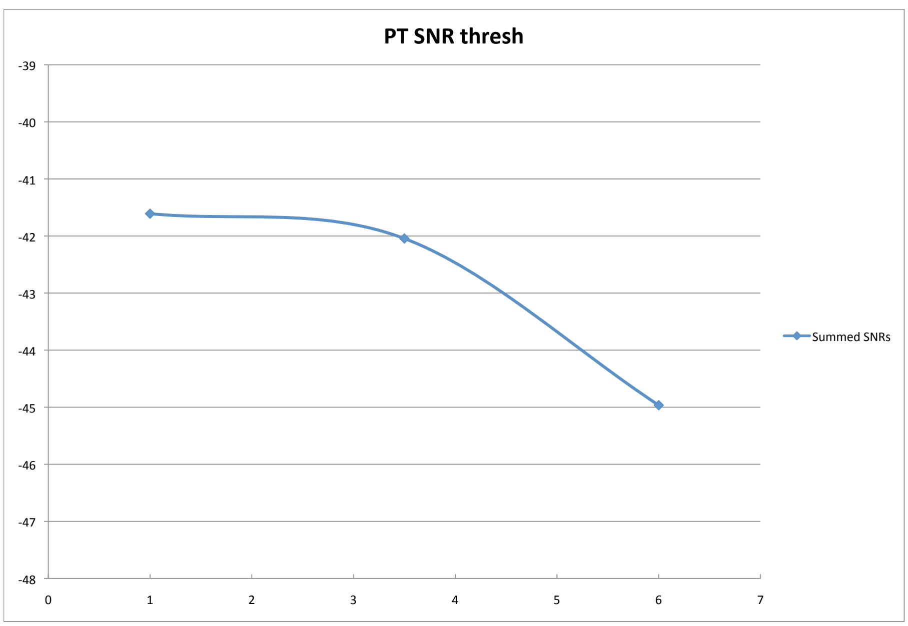


(b) Bin Width SNR vs. SNR

Figure 4.3 Bin Width SNR vs. Marginal Means of Mean Response and SNR



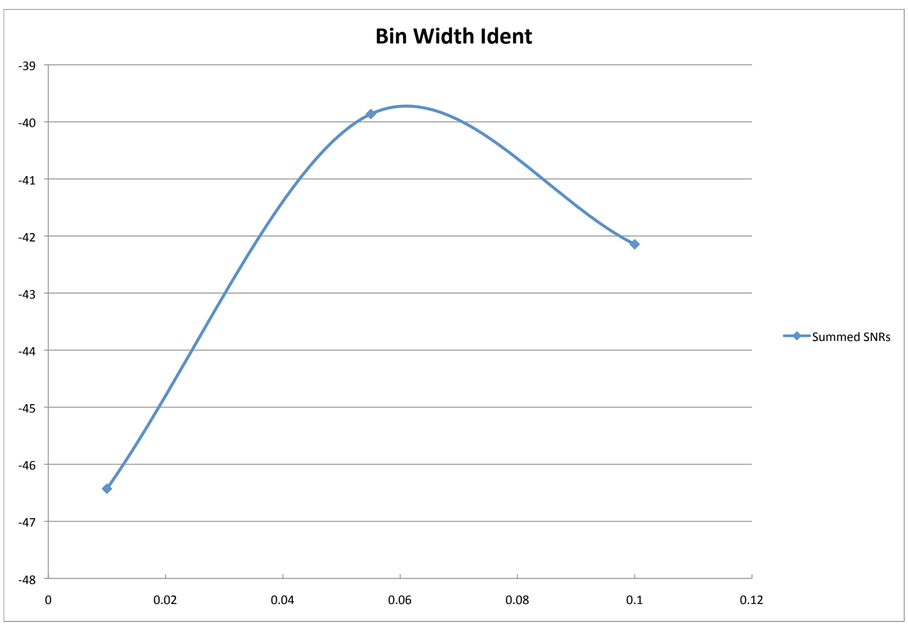
(a) PT SNR Threshold vs. Mean Response



(b) PT SNR Threshold vs. SNR

Figure 4.4 PT SNR Threshold vs. Marginal Means of Mean Response and SNR

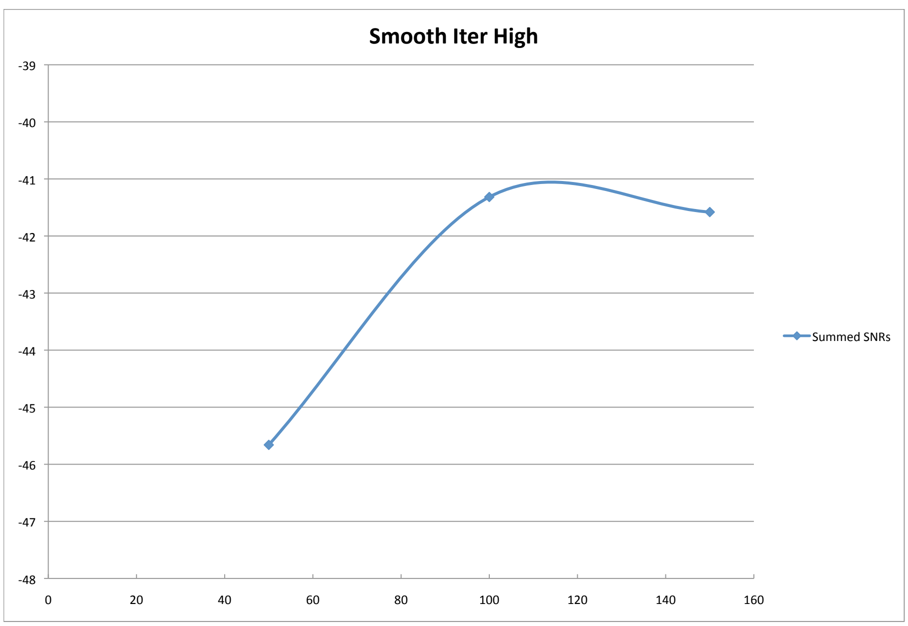
(a) Bin Width Ident vs. Mean Response



(b) Bin Width Ident vs. SNR

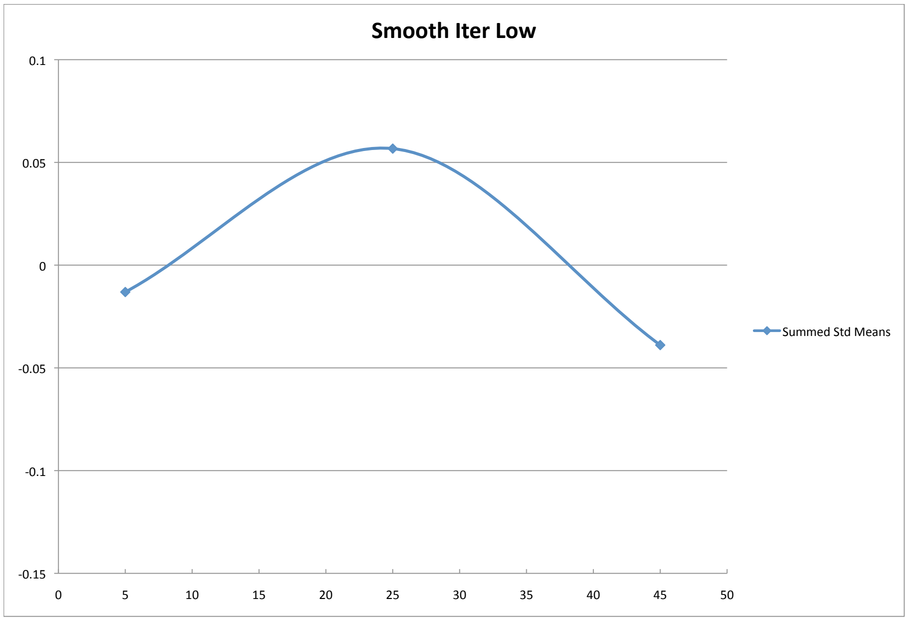
Figure 4.5 Bin Width Ident vs. Marginal Means of Mean Response and SNR

(a) Smooth Iter High vs. Mean Response

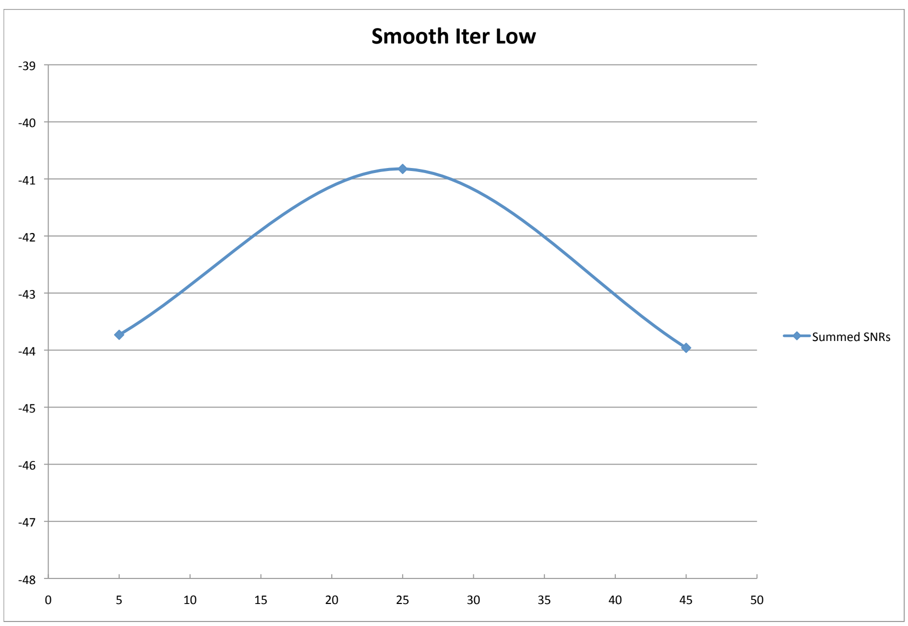


(b) Smooth Iter High vs. SNR

Figure 4.6 Smooth Iter High vs. Marginal Means of Mean Response and SNR

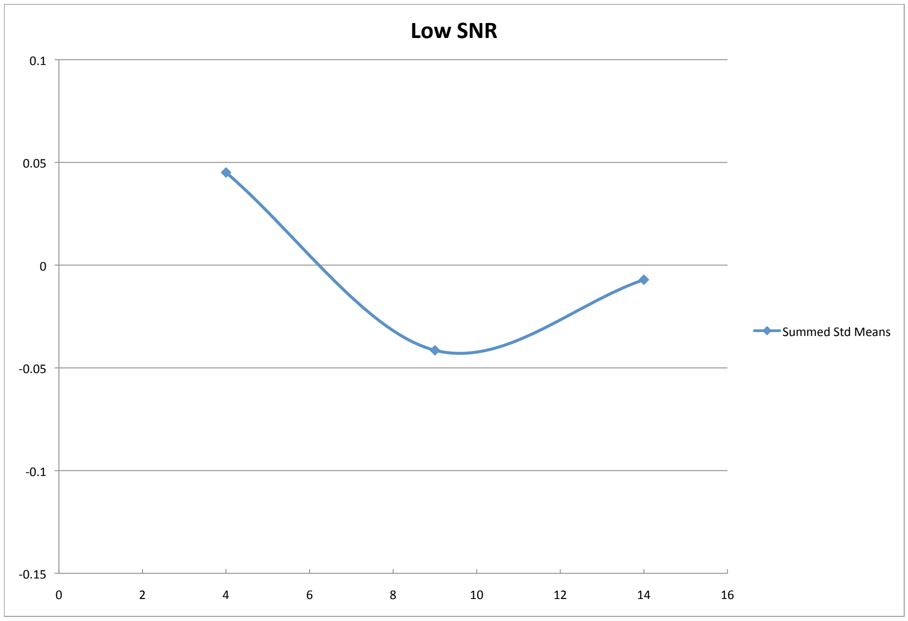


(a) Smooth Iter Low vs. Mean Response

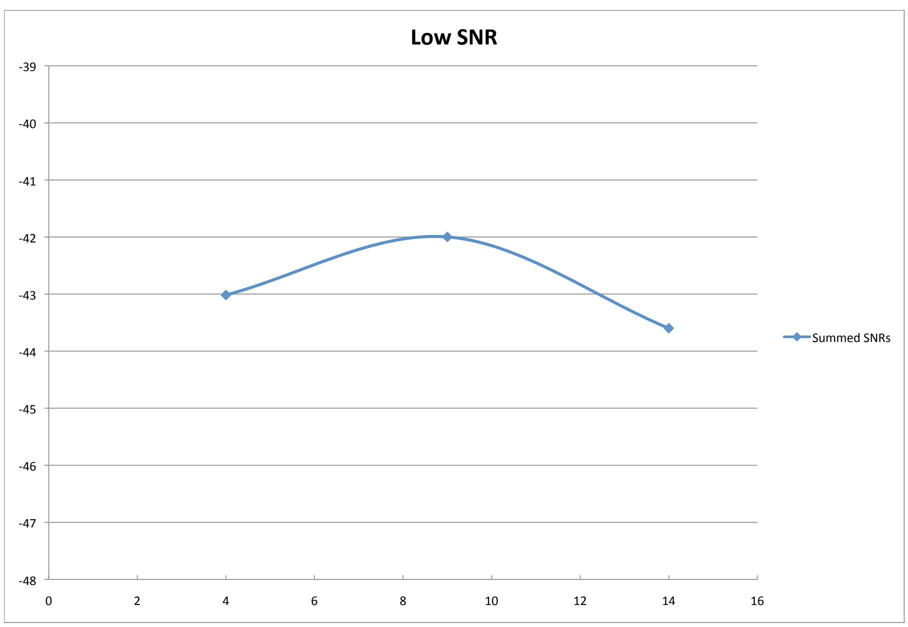


(b) Smooth Iter Low vs. SNR

Figure 4.7 Smooth Iter Low vs. Marginal Means of Mean Response and SNR

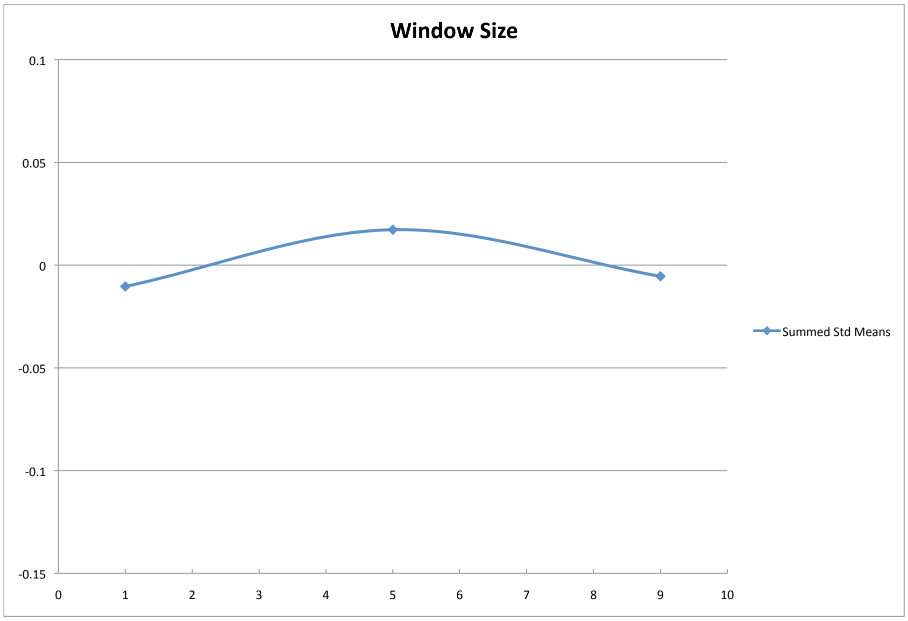


(a) Low SNR vs. Mean Response

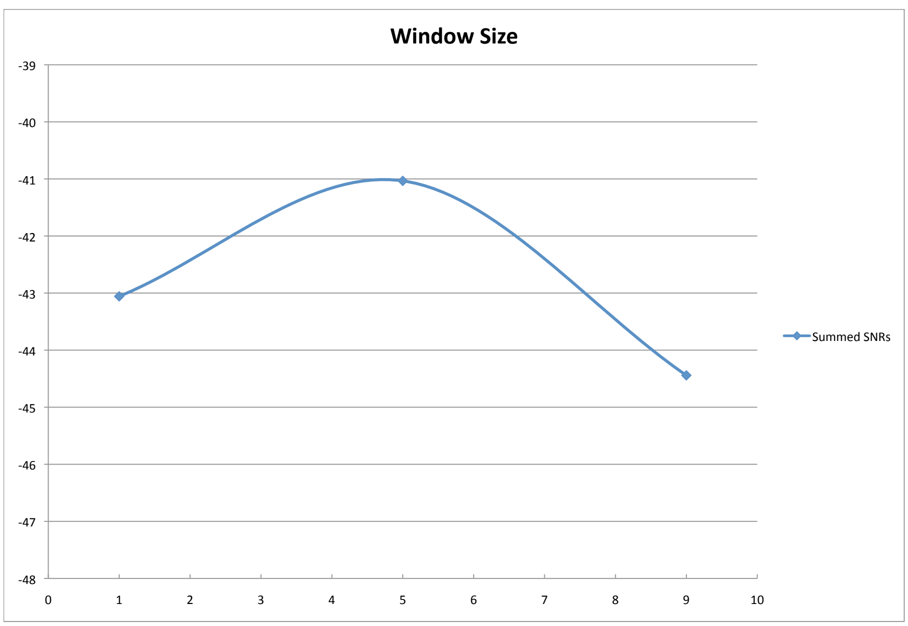


(b) Low SNR vs. SNR

Figure 4.8 Low SNR vs. Marginal Means of Mean Response and SNR

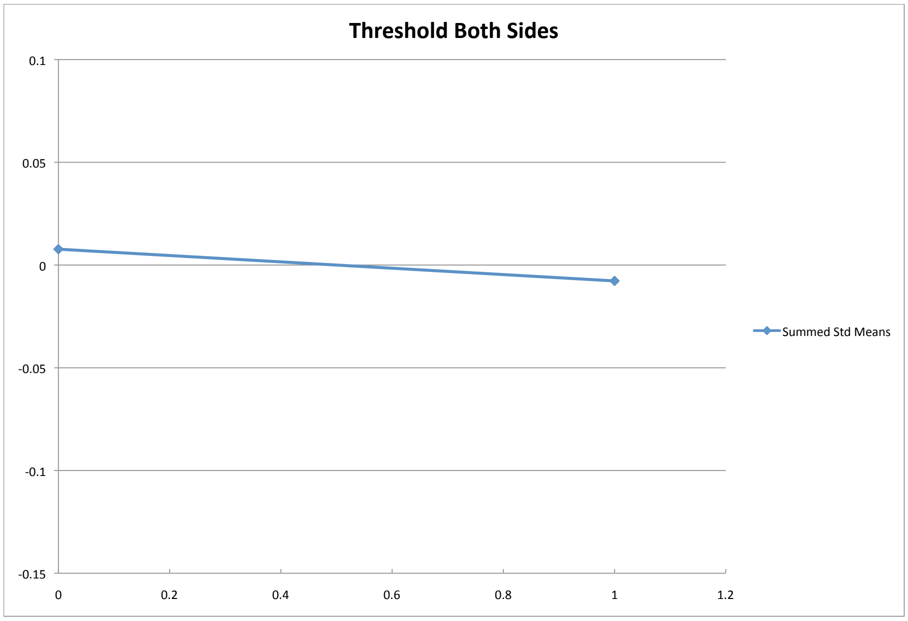


(a) Window Size vs. Mean Response

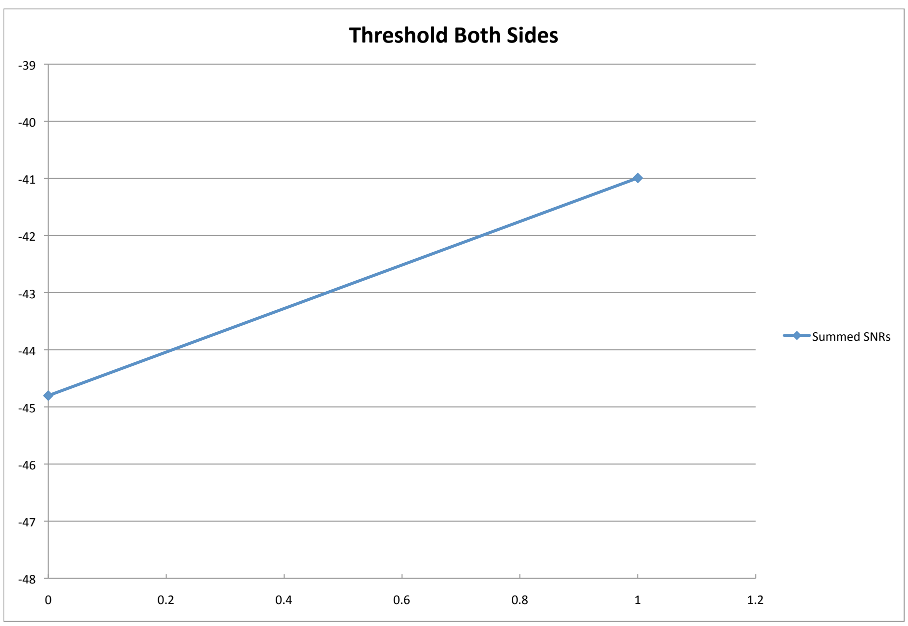


(b) Window Size vs. SNR

Figure 4.9 Window Size vs. Marginal Means of Mean Response and SNR

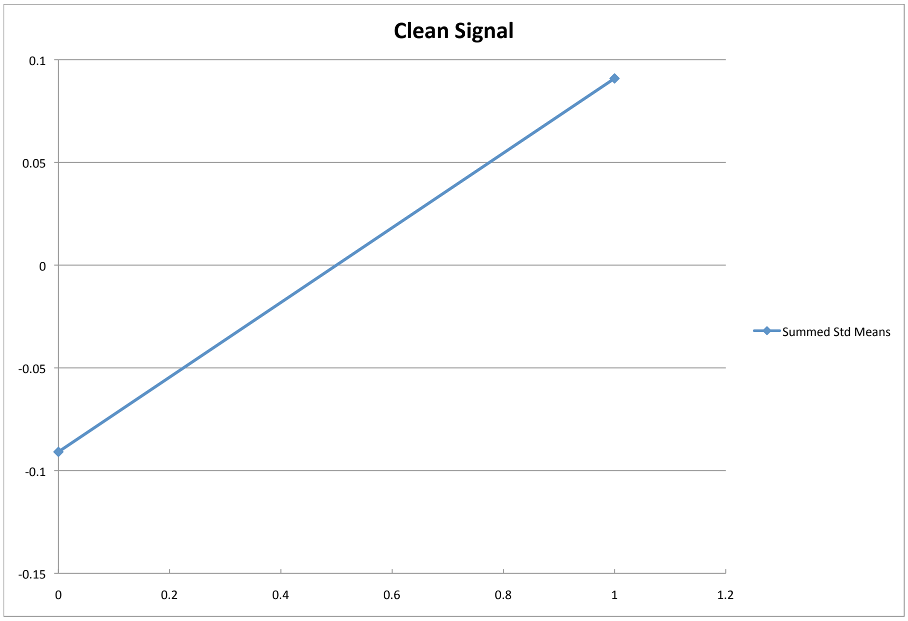


(a) Threshold Both Sides vs. Mean Response

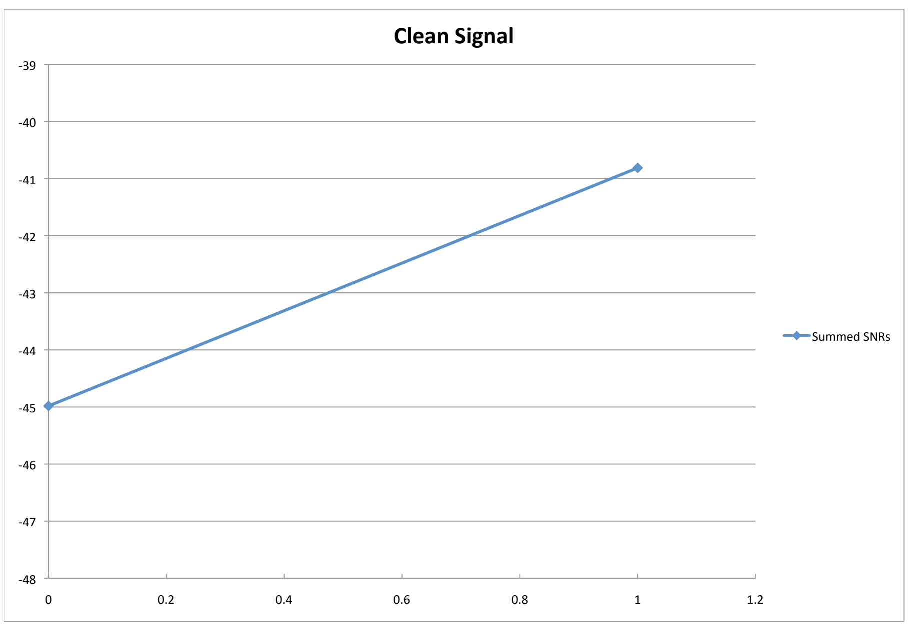


(b) Threshold Both Sides vs. SNR

Figure 4.10 Threshold Both Sides vs. Marginal Means of Mean Response and SNR



(a) Clean Signal vs. Mean Response



(b) Clean Signal vs. SNR

Figure 4.11 Clean Signal vs. Marginal Means of Mean Response and SNR

Control Variable	**Selected Level**	**Expected Standardized Mean Response**
Dimension Adjust	-2	0.084166467
Max Score	6	0.05696234
Bin Width Indentify	0.1	0.079172116
Smooth Iterations High	50	0.05862537
Smooth Iteration Low	25	0.056707338
Low SNR	4	0.045094616
Clean Signal	1	0.090871599

Table 4.3 Significant Controls Variables, Their Levels, and Expected Standardized Mean Responses

analysis to determine control variable levels [10], after close examination of the data in Table 4.2 and Figures 4.1 through 4.11, levels were first selected to adjust mean response appropriately, while the remaining control variables were used to maximize SNR.

Regardless of selection methodology, criteria must be developed to determine which control variables exert large enough influence on either mean response or SNR to be categorized as significant to one or both measures. Only one heuristic required development during analysis, since mean response was maximized prior to considering SNR. The heuristic developed for determining which control variables were significant contributors in maximizing mean response was simple and straightforward. If any observed level for a particular control produced a standardized marginal mean response ≥ 0.04, then the control was deemed significant to mean response and the level producing the max response selected as robust in the design space. Applying this heuristic to the marginal mean responses in Table 4.2 resulted in selecting seven of 11 control variables as significant to mean response. These controls, along with their selected levels and the expected mean response at these levels are presented in Table 4.3.

Selecting mean response controls is the first half of the selection process. Analysis of the remaining controls must now be done to determine the appropriate levels

to maximize the SNR and thus minimize response variance. This portion of the analysis is truly a pick-the-winner exercise and the plots of control vs. SNR in Figures 4.1 through 4.11 make the analysis elementary. Selecting the point in each of the appropriate plots and noting it's corresponding level resulted in the expected SNR's presented in Table 4.4.

Control Variable	**Selected Level**	**Expected SNR**
Bin Width SNR	0.06	-41.64158433
PT SNR Threshold	3.5	-42.04400436
Window Size	5	-41.03432788
Threshold Both Sides	1	-40.99105378

Table 4.4 Significant Controls Variables, Their Levels, and Expected SNR

4.2 Combined Array

Analysis of the results of the combined array RPD problem for AutoGAD will be provided in this section. Recall from section 3.4 the technique utilized is adapted from a methodology presented by Brenneman and Myers [2] and is unique in that it treats noise as a categorical variable. Development of the experimental design is also detailed in section 3.4. The end result of the experimental design was a 174-run D-Optimal design augmented with 32 center point runs for a total of 206 runs.

The runs were conducted assigning control variable levels according to the randomized experimental design. Both control levels and response results for each of the 206 runs is presented in Table B.1 in App. B.

As discussed at length in section 3.5, analysis of the individual response parameters was problematic and a dimension reduction strategy was therefore employed. In a fashion similar to the response transformations for the crossed array analysis, the combined array data was first standardized to deal with response unit and scal-

ing issues. This standardized data reported in Table 4.5 was computed using Eq. 3.9.

These standardized response data were then reduced in dimensionality according to Eq. 3.10 to develop a one dimensional response. The one dimensional standardized response data used in completion of the combined array analysis are provided in Table 4.6.

The first step in the remaining analysis is to perform ANOVA on the data in Table 4.6. As detailed in Section 3.4, ANOVA was accomplished using a backward stepwise regression with an $\alpha = 0.1$. The ANOVA resulted in a quadratic model with 17 terms and an adjusted R^2 of 0.663196. The ANOVA table is shown in Table 4.7.

While the adj-R^2 for this model is lower than three of the four from the individual responses, recall both the raw and transformed response models produced infeasible predictions. The equation for the one dimensional standardized response model is given in Eq. 4.1.

Std Run	Std Time	Std TPF	Std FPF	Std TFP
1	-0.484213	0.782758	1.4288377	-0.040918
2	-0.449006	-1.730957	-0.458022	-1.268384
3	-0.486735	0.8337966	-0.458022	1.1603184
4	-0.421206	-1.730957	-0.458022	-1.268384
5	-0.511818	0.8337966	-0.458022	1.1603184
6	-0.478797	0.8337966	0.0364982	-1.268384
7	-0.462464	-0.397285	-0.443619	1.1166017
8	-0.473456	-0.556557	-0.429215	1.0770139
9	-0.461664	0.3364908	-0.049923	-0.444325
10	-0.350101	-1.730957	-0.438818	-1.268384
11	-0.48769	0.7922475	0.8238902	0.0355864
12	-0.494466	0.787118	0.3917848	0.2556268
13	-0.020063	-1.730957	-0.458022	-1.268384
14	-0.432139	0.0607797	-0.270777	0.0695882
15	-0.473169	0.8337966	-0.169952	-1.268384
16	-0.415683	-0.048222	-0.443619	1.1238878
17	2.3886538	0.5532125	-0.155549	-0.066419
18	-0.144327	-1.730957	-0.458022	-1.268384
19	-0.36335	-1.730957	-0.458022	-1.268384
20	-0.485375	-1.730957	-0.458022	-1.268384
21	2.7567682	-1.730957	-0.458022	-1.268384
22	-0.415444	-1.730957	-0.381204	-1.268384
23	-0.489209	0.8337966	-0.458022	1.1603184
24	-0.455948	0.8337966	-0.400408	-1.268384
25	-0.449047	0.474218	-0.458022	1.1603184
26	2.3836287	0.7555716	1.2559955	-0.818102
27	-0.482906	0.276219	-0.189157	-0.234485
28	-0.483648	0.8337966	-0.458022	1.1603184
29	-0.454326	-0.582204	-0.414812	1.0267398
30	-0.457406	-1.730957	-0.458022	-1.268384
31	-0.356282	-1.730957	-0.458022	-1.268384
32	0.1149563	0.8337966	-0.458022	1.1603184
33	-0.49848	0.8337966	-0.458022	1.1603184
34	-0.443365	0.6740124	0.0172935	0.640819
35	3.0643035	0.5678316	-0.256373	0.1798513
36	-0.455242	-1.730957	-0.458022	-1.268384
37	-0.496108	0.3947107	-0.208361	0.1582358
38	-0.477678	0.7212039	-0.189157	0.8370581
39	-0.456579	-0.209545	-0.458022	1.1603184
40	-0.486928	0.7229992	4.9192887	-1.052715
41	-0.51035	0.8337966	-0.458022	1.1603184
42	-0.498231	0.8337966	-0.458022	1.1603184
43	-0.464813	0.7799367	0.0845099	0.6621915
44	3.0829541	0.6465695	-0.333192	0.5154979
45	-0.407321	0.5644974	0.0797088	-0.334548
46	-0.282896	-1.730957	-0.458022	-1.268384
47	-0.42956	0.3913765	1.0639487	-1.017256
48	0.2140991	-1.730957	-0.458022	-1.268384
49	-0.484995	0.7240251	-0.381204	1.0158106
50	-0.509261	0.8337966	-0.458022	1.1603184
51	-0.474375	0.8337966	-0.458022	1.1603184
52	-0.486848	0.8153303	0.7038609	0.1065045
53	0.707886	-1.730957	-0.458022	-1.268384
54	-0.089728	-1.730957	-0.458022	-1.268384
55	-0.488006	0.333413	2.1922238	-0.889992
56	-0.442097	0.751468	0.6462469	0.2578126
57	-0.446293	-0.651709	-0.458022	1.1547324
58	-0.464569	-1.730957	-0.458022	-1.268384
59	-0.488853	0.8337966	-0.458022	1.1603184
60	-0.476711	0.8337966	-0.458022	1.1603184
61	-0.465205	-0.062585	0.3917848	-0.548031
62	2.0872318	0.6511861	-0.184356	0.3792477
63	-0.474139	0.0538549	-0.395607	0.4810104
64	-0.502144	0.7027376	3.2628848	-0.98374
65	-0.27699	-1.730957	-0.458022	-1.268384
66	-0.18759	-1.730957	-0.458022	-1.268384
67	-0.394409	-1.687357	0.2765567	-1.257455
68	-0.494743	0.8337966	-0.458022	1.1603184
69	0.0880032	0.8337966	-0.458022	1.1603184
70	-0.379729	-0.005904	-0.419613	1.065599
71	1.7209448	0.7463384	2.0721945	-0.954353
72	-0.478035	0.2339006	-0.419613	0.7709974
73	-0.462983	-0.396516	-0.44842	1.0403405
74	-0.479962	-0.57374	-0.381204	0.9361492
75	-0.386502	-0.459352	-0.294783	0.8028134
76	-0.423464	-0.410366	-0.381204	0.0984898
77	-0.503836	0.8337966	-0.458022	1.1603184
78	-0.486764	0.8337966	0.9055101	-1.268384
79	-0.484007	0.8337966	1.5248611	-0.157253
80	2.8934945	-1.730957	-0.458022	-1.268384
81	1.4007234	-1.730957	-0.458022	-1.268384
82	-0.490903	0.370602	-0.261174	0.2891429
83	-0.460052	-1.730957	-0.458022	-1.268384
84	-0.486417	0.8337966	-0.458022	1.1603184
85	-0.403774	-1.687357	0.2621532	-1.257212
86	-0.489071	0.8337966	-0.390806	-1.268384
87	-0.475066	0.8337966	2.1010016	-1.268384
88	-0.458812	0.8337966	2.9988205	-0.40498
89	2.3844474	0.771473	4.1799084	-1.071416
90	1.4641153	0.3077655	-0.342794	0.2602413
91	-0.463037	-0.098748	-0.280379	0.2381401
92	-0.215228	-1.730957	-0.458022	-1.268384
93	-0.397473	-1.687357	0.2333462	-1.256726
94	-0.506839	0.8337966	1.7793231	-1.268384
95	-0.476588	0.8337966	-0.458022	1.1603184
96	-0.488167	0.7922475	0.5214164	0.1910233
97	2.398119	0.7504421	0.2765567	-0.197812
98	-0.470695	-0.102082	-0.405209	0.5293415
99	-0.50025	0.7335147	2.2066273	-0.87882
100	-0.324106	-1.328804	-0.410011	-0.342077
101	-0.467317	0.8337966	-0.458022	1.1603184
102	-0.496909	0.8337966	-0.458022	1.1603184
103	-0.149806	-1.730957	-0.458022	-1.268384
104	3.2566992	-1.730957	-0.458022	-1.268384
105	1.216217	0.0902744	0.1229193	-0.506986
106	-0.138909	-1.730957	-0.458022	-1.268384
107	-0.472189	0.7288981	0.2381474	0.4705669
108	-0.434723	-0.629909	-0.410011	1.0119247
109	-0.45527	0.4696015	-0.458022	1.1603184
110	-0.021341	-1.730957	-0.458022	-1.268384
111	-0.494648	0.8337966	-0.458022	1.1603184
112	-0.480424	0.8337966	-0.458022	1.1603184
113	-0.461625	0.6011734	-0.434016	1.1022724
114	3.6107827	-1.730957	-0.458022	-1.268384
115	-0.471755	0.537311	3.6661832	-1.134562
116	-0.480789	0.313408	-0.289981	0.3314023
117	-0.471401	-0.572202	-0.458022	1.1552181
118	-0.346891	-0.517829	-0.337993	0.8594022
119	-0.433299	-1.709157	-0.357198	-1.22831
120	-0.404236	0.8337966	-0.458022	1.1603184
121	0.1265824	0.8337966	-0.458022	1.1603184
122	-0.466902	0.4708839	-0.429215	1.0937719
123	2.4112978	0.5375675	-0.213163	0.0676453
124	1.3327041	0.3631642	-0.275578	0.015671
125	-0.441743	0.2408254	-0.289981	0.3911484
126	-0.473243	-0.572202	-0.405209	1.0007526
127	-0.444499	0.8337966	-0.458022	1.1603184
128	-0.468016	0.6191266	0.1037146	0.5439138
129	-0.512708	0.8337966	-0.458022	1.1603184
130	-0.481705	0.8337966	-0.458022	1.1603184
131	-0.500256	0.5801424	-0.405209	1.0454408
132	1.915622	0.7447996	2.1250074	-0.964796
133	1.0125032	0.589632	1.0351417	-0.933709
134	-0.481066	0.7263334	3.7622066	-0.991755
135	-0.454108	0.7473643	-0.20356	0.8545448
136	-0.019021	-1.730957	-0.458022	-1.268384
137	-0.414425	-1.730957	0.4349954	-1.268384
138	-0.50853	0.8337966	-0.458022	1.1603184
139	-0.47928	0.8337966	4.9913062	-1.268384
140	-0.462898	0.6096371	-0.405209	1.0471408
141	2.0317395	0.4844771	-0.3668	0.5679579
142	1.1071804	0.3008407	-0.227566	-0.170853
143	-0.472266	0.2746802	0.142124	-0.448211
144	-0.28353	-1.730957	-0.458022	-1.268384
145	-0.320189	-1.730957	-0.458022	-1.268384
146	-0.367784	-1.730957	-0.458022	-1.268384
147	-0.508011	0.8337966	-0.458022	1.1603184
148	-0.437747	0.8337966	-0.458022	1.1603184
149	0.0402206	-1.730957	-0.458022	-1.268384
150	2.6038295	0.4118945	-0.410011	0.8436156
151	-0.402083	0.2523668	-0.381204	0.4287933
152	-0.493773	0.2987889	-0.184356	0.0542874
153	-0.408022	-0.139528	-0.136344	0.6833213
154	-0.442489	-1.730957	-0.410011	-1.268384
155	-0.49088	0.8337966	-0.405209	-1.268384
156	-0.48487	0.8337966	-0.458022	1.1603184
157	-0.467741	0.485503	-0.434016	1.1032439
158	2.0201006	0.4844771	-0.424414	0.9174482
159	-0.398356	0.3734232	-0.400408	0.6043884
160	-0.493963	0.7171003	2.7155514	-0.939295
161	-0.488047	0.7171003	3.4549317	-0.994426
162	-0.313691	-1.730957	-0.458022	-1.268384
163	-0.335817	-1.730957	-0.102736	-1.268384
164	-0.466671	-0.501414	-0.395607	0.9890949
165	-0.36877	0.4475446	-0.328391	0.2604842
166	-0.486474	0.6232303	2.7731654	-0.907964
167	-0.297638	-1.730957	-0.458022	-1.268384
168	-0.436581	0.5326944	-0.371601	1.0325686
169	-0.419876	0.532438	-0.371601	1.0347545
170	-0.442074	0.6870926	-0.376402	1.0483552
171	-0.396932	0.6870926	-0.376402	1.0483552
172	-0.427773	-0.136193	-0.361999	0.0880463
173	-0.414094	-0.136193	-0.3668	0.1303058
174	-0.37387	-0.868687	-0.32359	-0.472255
175	-0.343927	-0.868687	-0.3668	-0.247843
176	-0.481194	0.8337966	-0.458022	1.1603184
177	-0.507472	0.8337966	-0.458022	1.1603184
178	-0.502814	0.8337966	-0.458022	1.1603184
179	-0.501282	0.8337966	-0.458022	1.1603184
180	0.2935956	0.8337966	-0.040321	-1.268384
181	-0.484639	0.8337966	-0.145946	-1.268384
182	-0.409744	0.8337966	-0.256373	-1.268384
183	0.3673073	0.8337966	-0.198759	-1.268384
184	-0.484562	0.7391571	-0.361999	0.9835089
185	-0.49002	0.6840149	-0.390806	1.0264969
186	-0.444809	0.4421586	-0.453221	1.151575
187	-0.455738	0.4308737	-0.453221	1.1513322
188	2.5440615	0.6201525	0.3245685	-0.573289
189	2.3518865	0.6270774	-0.275578	0.2614557
190	2.4399859	0.7178697	-0.309186	0.5424565
191	2.622788	0.7424913	-0.424414	0.9932237
192	-0.376706	0.4672932	-0.222765	-0.10455
193	-0.456538	0.4195888	-0.361999	0.4045062
194	-0.39559	0.4152287	-0.333192	0.3610325
195	-0.406602	0.2931464	-0.443619	1.0046386
196	0.1354085	0.4919148	0.2141415	-0.384093
197	-0.493221	0.5360286	-0.179554	0.1720794
198	0.1898562	0.2654471	-0.145946	0.1640647
199	0.1610732	0.2533927	-0.169952	0.1949092
200	2.4185917	0.7627529	0.3005626	-0.261687
201	2.3331769	-1.730957	-0.458022	-1.268384
202	3.6034169	-1.730957	-0.458022	-1.268384
203	-0.510955	0.8337966	-0.458022	1.1603184
204	-0.451413	-1.730957	-0.458022	-1.268384
205	-0.484215	0.8337966	-0.458022	1.1603184
206	-0.499373	0.8337966	-0.458022	1.1603184

Table 4.5 Combined Array Standardized Response Data

Std Run	Std Total	Std Run	Std Total	Std Run	Std Total	Std Run	Std Total	Std Run	Std Total
1	-0.202785	43	1.8224309	84	2.9385544	125	1.3636977	166	-2.571426
2	-2.092313	44	-1.587695	85	-2.802948	126	1.3070039	167	-2.243681
3	2.9388727	45	0.5575618	86	0.4452896	127	2.8966362	168	2.3734457
4	-2.120113	46	-2.258423	87	-2.060523	128	1.5273413	169	2.3586699
5	2.9639548	47	-1.260269	88	-2.111192	129	2.9648454	170	2.5539239
6	0.0077118	48	-2.755418	89	-6.864299	130	2.9338424	171	2.5087822
7	1.6253994	49	2.6060346	90	-0.553314	131	2.5310482	172	0.7416251
8	1.4231291	50	2.9613986	91	0.8828077	132	-4.260626	173	0.7750064
9	0.4037519	51	2.9265125	92	-2.326091	133	-2.391722	174	-0.643483
10	-2.210422	52	0.7048222	93	-2.779955	134	-3.546562	175	-0.405804
11	0.4916339	53	-3.249205	94	-1.707072	135	2.2595772	176	2.9333317
12	1.1454256	54	-2.451591	95	2.9287248	136	-2.522298	177	2.9596098
13	-2.521256	55	-2.260797	96	0.9500219	137	-3.019912	178	2.9549516
14	0.8332834	56	0.8051304	97	-2.122046	138	2.9606672	179	2.9534194
15	0.2085339	57	1.4073386	98	1.3031638	139	-4.946614	180	-0.687862
16	1.9349669	58	-2.07675	99	-1.851682	140	2.5248854	181	0.1959976
17	-1.746312	59	2.94099	100	-0.936765	141	-0.612504	182	0.2315297
18	-2.396992	60	2.928848	101	2.9194547	142	-0.749627	183	-0.603135
19	-2.177969	61	-0.537195	102	2.9490462	143	0.1566107	184	2.5692265
20	-2.055944	62	-0.872442	103	-2.391513	144	-2.257789	185	2.5913382
21	-5.298087	63	1.4046115	104	-5.798018	145	-2.22113	186	2.4917643
22	-2.202694	64	-3.041743	105	-1.755848	146	-2.173534	187	2.4911646
23	2.9413467	65	-2.264329	106	-2.40241	147	2.9601487	188	-2.821767
24	0.421769	66	-2.353729	107	1.4335063	148	2.8898838	189	-1.187776
25	2.5416055	67	-2.826959	108	1.22675	149	-2.58154	190	-0.870474
26	-3.702155	68	2.9468801	109	2.5432126	150	-0.938309	191	-0.462659
27	0.7137967	69	2.3641341	110	-2.519978	151	1.4644465	192	0.962214
28	2.9357852	70	1.8590369	111	2.9467851	152	1.0312045	193	1.6426322
29	1.3136734	71	-4.001154	112	2.9325617	153	1.0881592	194	1.5050428
30	-2.083913	72	1.902546	113	2.5990873	154	-2.146841	195	2.1480062
31	-2.185037	73	1.5552272	114	-6.152102	155	0.4615024	196	-0.241729
32	2.337181	74	1.2235748	115	-3.79168	156	2.9370068	197	1.3808834
33	2.9506168	75	1.0247453	116	1.4155805	157	2.4905042	198	0.3856018
34	1.7409024	76	0.4927919	117	1.5124396	158	-0.193761	199	0.4571809
35	-2.060247	77	2.9559731	118	1.0264573	159	1.7765763	200	-2.218088
36	-2.086077	78	-0.853334	119	-2.146971	160	-2.443783	201	-4.874496
37	1.2574161	79	-0.36431	120	2.8563734	161	-3.244211	202	-6.144736
38	2.2250971	80	-5.434813	121	2.3255549	162	-2.227628	203	2.9630925
39	1.8653747	81	-3.942042	122	2.4607728	163	-2.560789	204	-2.089906
40	-4.762077	82	1.4118226	123	-1.592922	164	1.3499583	205	2.9363524
41	2.9624868	83	-2.081267	124	-0.678291	165	1.4051896	206	2.95151
42	2.9503679								

Table 4.6 Combined Array One Dimensional Standardized Response Data

Source	**Sum of Squares**	**Degrees of Freedom**	**Mean Square**	**F Value**	**p-value Prob < F**
Model	878.7585661	41	21.43313576	10.84543387	< 0.0001
A	3.792812756	1	3.792812756	1.919210533	0.1678
B	13.07239132	1	13.07239132	6.614792961	0.0110
C	5.018482374	1	5.018482374	2.539414639	0.1130
D	2.118686367	1	2.118686367	1.072081712	0.3020
E	59.59742067	1	59.59742067	30.15703777	< 0.0001
F	0.328422092	1	0.328422092	0.166185673	0.6841
G	0.521041485	1	0.521041485	0.263653486	0.6083
H	0.063147215	1	0.063147215	0.031953278	0.8584
J	21.27632813	1	21.27632813	10.76608725	0.0013
K	1.135396085	1	1.135396085	0.574524572	0.4496
L	4.774900156	1	4.774900156	2.416159	0.1220
M	559.7014493	7	79.9573499	40.45941575	< 0.0001
BE	11.23480116	1	11.23480116	5.684949432	0.0183
BM	44.58736527	7	6.36962361	3.223108947	0.0032
EM	42.77769292	7	6.111098989	3.092292266	0.0043
JM	51.3238605	7	7.331980072	3.710073313	0.0009
J^2	47.93661496	1	47.93661496	24.25652472	< 0.0001
Residual	324.1026876	164	1.9762359		
Lack of Fit	320.9456241	157	2.044239644	4.532591004	0.0199
Pure Error	3.157063475	7	0.451009068		
Cor Total	1202.861254	205			

Table 4.7 ANOVA for One Dimensional Standardized Response

$$
\begin{aligned}
\widehat{O} = 0.928732608 &- 0.16093589 \times A \\
&+ 0.287762309 \times B + 0.18357479 \times C \\
&+ 0.118276589 \times D + 0.622239684 \times E \\
&+ 0.047485806 \times F - 0.059166689 \times G \\
&+ 0.021716595 \times H + 0.365644744 \times J \\
&+ 0.076358805 \times K - 0.160423161 \times L \\
&+ 0.774824531 \times M[1] - 1.779421789 \times M[2] \\
&+ 2.456865236 \times M[3] + 1.464838509 \times M[4] \\
&+ 1.22827625 \times M[5] - 2.906496946 \times M[6] \\
&- 0.28650865 \times M[7] - 0.29846376 \times BE \\
&- 0.145106798 \times BM[1] - 0.609422884 \times BM[2] \\
&+ 0.050601077 \times BM[3] + 1.104654031 \times BM[4] \\
&+ 0.391108084 \times BM[5] - 0.258359334 \times BM[6] \\
&+ 0.165166983 \times BM[7] - 0.661393958 \times EM[1] \\
&- 0.21250146 \times EM[2] - 0.483520254 \times EM[3] \\
&+ 0.220174878 \times EM[4] - 0.493187564 \times EM[5] \\
&+ 0.435434061 \times EM[6] + 0.235208103 \times EM[7] \\
&+ 0.519721233 \times JM[1] - 0.185781319 \times JM[2] \\
&- 0.688586044 \times JM[3] - 1.094824113 \times JM[4] \\
&+ 0.459949215 \times JM[5] + 0.782221794 \times JM[6] \\
&+ 0.01039305 \times JM[7] - 1.197693658 \times J^2
\end{aligned} \tag{4.1}
$$

This model was converted using the techniques from section 3.4.1 into an estimated mean response model for predicting the expected value of the mean response

across all noise categories. Once again, the observed probabilities of occurence given in Table 3.6 were used within Eq. 3.4 to produce a reduced estimated mean model for the one dimensional response provided in Eq. 4.2. Figures containing the step-by-step analysis conducted in Excel® are included in App. B, Figures B.1 and B.2.

$$
\begin{aligned}
\widehat{E_z}\left[y\left(\widehat{O},\mathbf{z}\right)\right] = {} & 1.091525694 \\
& - 0.16093589 \times A \\
& + 0.373480157 \times B \\
& + 0.18357479 \times C \\
& + 0.118276589 \times D \\
& + 0.493179787 \times E \\
& + 0.047485806 \times F \\
& - 0.059166689 \times G \\
& + 0.021716595 \times H \\
& + 0.32925413 \times J \\
& + 0.076358805 \times K \\
& - 0.160423161 \times L \\
& - 0.29846376 \times BE \\
& - 1.197693658 \times J^2
\end{aligned} \tag{4.2}
$$

The next step in the analysis is to develop a variance model from Eq. 4.1. Continuing the procedure layed out in section 3.4.2, Eq. 3.7 is used to generate a variance model since the p_i is known for each category of the noise. Once again, this model is extremely large due to the number of variance and covariance terms generated within the summations, therefore it is not included here in equation form.

Variance Model							
	Estimate	Interaction (B)	Interaction(E)	Interaction(J)		P	Q
M[1]	0.774824531	-0.145106798	-0.661393958	0.519721233		0.121359223	0.878640777
M[2]	-1.779421789	-0.609422884	-0.21250146	-0.185781319		0.126213592	0.873786408
M[3]	2.456865236	0.050601077	-0.483520254	-0.688586044		0.13592233	0.86407767
M[4]	1.464838509	1.104654031	0.220174878	-1.094824113		0.121359223	0.878640777
M[5]	1.22827625	0.391108084	-0.493187564	0.459949215		0.126213592	0.873786408
M[6]	-2.906496946	-0.258359334	0.435434061	0.782221794		0.116504854	0.883495146
M[7]	-0.28650865	0.165166983	0.235208103	0.01039305		0.121359223	0.878640777

Figure 4.12 Elements of γ and Δ within the Variance Model

Squared Terms *PQ
0.391828773
4.239763716
0.000209398
1.487914038
3.174797899
0.169757375
0.063153693

Figure 4.13 Products of Squared terms, p, and q within first summation term in Eq. 3.7

However, the terms of the variance model are included in Figures 4.12, 4.13, and 4.14.

The values in Fig. 4.12 are taken directly from Eq. 4.1 and are the elements of γ and Δ in Eq. 3.7. They are appropriately multiplied by the control variable levels, then the entire term is squared before being multiplied by the product of the appropriate elements of the P and Q columns. Recall from Eq. 2.13 multinomial variance is given by diagonal elements, pq, and covariance by the off-diagonal terms, $-p_ip_j$. The values in Fig. 4.13 are the results of these computations and represent the first term in Eq. 3.7.

The double sum term is computed in a similar manner, however instead of squaring a row's result, it is multiplied by another row's result. This product is then

Covariance Terms Matrix (Upper and lower combined)						
V(M[1])	-0.364107918	-0.002670326	0.210925221	0.315077462	-0.069613445	0.043454921
	V(M[2])	0.008982694	-0.709530194	-1.059887347	0.234172287	-0.146177771
		V(M[3])	-0.005203613	-0.007773092	0.001717393	-0.001072051
			V(M[4])	0.613985474	-0.1356544	0.084679781
				V(M[5])	-0.20263885	0.126493599
					V(M[6])	-0.027947588
						V(M[7])

Figure 4.14 Covariance terms summed within the second term of Eq. 3.7

Parameter	**Type**	**Test Range**
Max Score Threshold	Continuous	[6, 14]
Bin Width Indentify	Continuous	[0.01, 0.1]
Window Size	Discrete	[1, 9]

Table 4.8 Variance Model Control Factors and their ranges

multiplied by 2 and it's appropriate covariance. The values in Fig. 4.14 represent these covariance products and their sum is the second term in Eq. 3.7.

The final term is simply the variance from the model and is found in the ANOVA table, 4.7, as the Mean Square of Residual. In this case $\sigma^2 = 1.9762359$.

All the components of the variance model are now present, so all that remains is to minimize the sum of the elements in Fig. 4.13 and Fig. 4.14, and σ^2. This minimization is subject to bounding contstraints on the ranges of the control variables present in the variance model. These variables along with their upper and lower bounds are restated in Table 4.8.

Evaluation of the minimization was conducted using an Excel® add-in called What's Best!® 9.0 developed by LINDO Systems, Inc. This software makes a powerful LP/IP solver available within a spreadsheet. It is therefore ideal to solve the mixed integer minimization problem presented by the variance model developed above. The minimized variance returned by the solver was 11.54013698. The actual value of the minimized variance doesn't convey much information in and of itself. What is important is the levels of the control variables that produce it. These

Parameter	Level
Max Score Threshold	6
Bin Width Indentify	0.1
Window Size	4

Table 4.9 Control Factor Levels producing Minimized Variance

Parameter	Type	Test Range
Dimension Adjust	Discrete	[-2, 2]
Bin Width SNR	Continuous	[0.01, 0.1]
PT SNR Threshold	Continuous	[1, 6]
Smooth Iterations High	Discrete	[50, 150]
Smooth Iterations Low	Disrete	[5, 45]
Low SNR	Continuous	[4, 14]
Threshold Both Sides	Categorical	[0, 1]
Clean Signal	Categorical	[0, 1]

Table 4.10 Estimated Mean Model Control Factors and their ranges

levels represent the region on the response surface where variance is minimized, and consistent algorithm performance can be expected, regardless of the image of interest. The control variable levels producing minimized response variance are presented in Table 4.9.

The next and final step in analysis of the Combined Array is to maximize the estimated mean response. This is done by fixing the dispersion factors at the levels determined above to minimize response variance and then maximizing Eq. 4.2 by manipulating the remaining adjustment factors. This maximization was done using the What's Best!® add-in described earlier. For this problem the remaining significant controls were varied across their respective ranges given in Table 4.10.

The solver software produced a maximized estimated mean response of -6.3861. Recall that this is the one dimensional standardized response and as such, expresses the summation of four individual standardized responses as shown in Eq. 3.10. So, even though a negative result from a maximization problem seems nonintuitive, its underlying cause is relatively straightforward. Since each of the responses was given equal weight in the objective function, none is allowed to excel at the expense of the

Parameter	Level
Dimension Adjust	-2
Max Score Threshold	6
Bin Width SNR	0.1
PT SNR Threshold	6
Bin Width Indentify	0.1
Smooth Iterations High	150
Smooth Iterations Low	5
Low SNR	14
Window Size	4
Threshold Both Sides	1
Clean Signal	0

Table 4.11 Control Factor Levels producing Minimized Variance and Optimized Response

others. Therefore, each response settles on a value below it's sample mean and thus produces a negative standardized response. Summing four negative responses together inevitably results in a negative estimated mean response. It should be noted that dividing the maximized response by four reveals the individual responses all contributing ~-1.59 to the total. In other words, each response is within 2 standard deviations of its mean, which is a reasonable expectation given the equal weighting between them and the constraint to the minimized variance region of the response surface.

Finally, the control variable levels producing minimized variance and subsequently optimized response are summarized in Table 4.11.

4.3 Verifcation Experiment

Control factors enabling both optimized and robust algorithm performance have now been located using two separate RPD techniques. There are however, a few questions that remain:

- Is one technique better than another from an experimental design perspective (*e.g.* design matrix size, difficulty of analysis)?

- Which technique produced better parameter settings?
- Are the settings from either or both techniques better than those suggested by Johnson?

Answering the first question is a somewhat subjective matter. While quantifying the design size is objective enough; the Crossed Array required 2240 replications while the Combined Array required only 206, this is only a portion of the answer. Because of the one-[noise]factor-at-a-time nature of the Crossed Array designs, they will always be larger than a Combined Array design of the same resolution for a particular system. For this particular analysis, the difference in number of replications was not of particular consequence, since each replication only required an average of $\sim$21 seconds to complete. So even 2240 runs could be completed in less than 14 hours. However, as the techniques are applied to other algorithms with longer per replication execution times, design size becomes more important.

Measuring the difficulty of analysis is where the first question becomes more subjective. Most analysts would agree the Taguchi methodology is generally less tedious and therefore more expedient with regard to complete the analysis. However, the underlying source of the difference in required analysis effort is also the point of greatest criticism for Taguchi's methods. Not only has the statistical validity of the proposed SNR's been questioned, but they are also the point within the analysis where response and variance are confounded. This aggregation precludes the development of separate response and variance models, and as Myers and Montgomery [10] point out, development of separate models often provides significant insight into system processes.

For this particular analysis, the mixed variable nature of the control and noise factors required specialized techniques for the Combined Array analysis, whereas the Crossed Array analysis was somewhat indifferent to these characteristics. Once again, as these techniques are applied to the general algorithm with more standard control and noise spaces, the Combined Array analysis is more straightforward in

	Crossed Array Statistics							
	Time		**TPF**		**FPF**		**TFP**	
Image	Mean	Variance	Mean	Variance	Mean	Variance	Mean	Variance
ARES 1C	1.2121	0.0030	1	0	0	0	1	0
ARES 1D	6.0014	1.8244	0	0	0	0	0	0
ARES 1F	3.0394	0.0299	0.4604	3.17×10^{-17}	0.0015	4.84×10^{-22}	0.9165	0
ARES 2C	2.2088	0.1912	1	0	0	0	1	0
ARES 2D	3.4996	0.1342	0.8235	2.13^{-06}	0	0	1	0
ARES 2F	104.82	66.1218	0.9274	0.0001	0.0024	2.88×10^{-07}	0.7569	0.0020
ARES 3F	3.5923	0.2642	0.7137	7.97×10^{-06}	0.0004	0	0.9146	7.71×10^{-08}
ARES 4F	2.2397	0.0951	0.7363	8.26×10^{-06}	0.0021	1.14×10^{-08}	0.7685	6.81×10^{-05}
Total	15.8262	1158.68	0.7077	0.1010	0.0008	9.91×10^{-07}	0.7946	0.1005

Table 4.12 Mean and Variances from Crossed Array Verification Experiment

nature; effectively closing the analysis effort gap on Crossed Array analysis. Given these analysis attributes combined with significant difference in design sizes, the Combined Array is, in general, better than the Crossed Array with regard to experimental design.

The best way to answer two remaining questions is to conduct another designed experiment. However, development and analysis of this experiment is significantly less involved than those previously discussed. The experiment used for verifying algorithm performance at the suggested levels consisted of 64 runs at each of three sets of suggested control settings. Within each 64-run block, each noise category was tested eight times. Eight noise categories each tested eight times on three groups of control factor settings yields 192 total runs. The entire 192-run experiment was randomized to satisfy the independence assumption. The response data for each run was collected and resorted to restore the control setting blocks and the noise category groupings. Mean and variance was then computed for each technique's suggested settings both at the by image level and across the entire noise space.

Table 4.12 gives the mean and variance results from the Crossed Array block for each response both by image and as an aggregated total of all images. Tables

	Combined Array Statistics							
	Time		TPF		FPF		TFP	
Image	Mean	Variance	Mean	Variance	Mean	Variance	Mean	Variance
ARES 1C	1.2078	0.0028	1	0	0	0	1	0
ARES 1D	6.4289	4.7663	0	0	0	0	0	0
ARES 1F	2.5197	0.0760	0.4195	0	0.0011	0	0.9295	0
ARES 2C	7.8425	108.02	1	0	0	0	1	0
ARES 2D	2.1147	0.1772	0.9023	9.16×10^{-05}	0.0008	5.0×10^{-09}	0.9664	8.25×10^{-06}
ARES 2F	99.744	0.9181	0.8718	0.0001	0.0045	2.57×10^{-07}	0.5710875	0.0005
ARES 3F	2.8082	0.1066	0.6883	0.0005	0.0013	9.82×10^{-09}	0.717	0.0004
ARES 4F	1.8884	0.0237	0.8241	1.56×10^{-05}	0.0055	4.98×10^{-08}	0.5699	0.0001
Total	15.569	1045.9	0.7133	0.1059	0.0017	4.19×10^{-06}	0.7192	0.1048

Table 4.13 Mean and Variances from Combined Array Verification Experiment

4.13 and 4.16 do likewise for the Combined Array and Johnson's suggested setting blocks, respectively.

Answering the second question: "Which technique produced better parameter settings?" is now simply a matter of comparing the performance statistics in Tables 4.12 and 4.13. However, it is instructive to first examine the differences in parameter settings suggested by each of the techniques. Therefore, a complete list of the suggested parameters for each technique is given in Table 4.14 where differences are highlighted in red.

The first difference is in 'Bin Width SNR' which effects the smoothness of the signal histogram. The smaller bin sizes selected by the Crossed Array produce a less smooth histogram and reduce the SNR required for a map to be nominated as containing potential targets. Next is 'PT SNR Threshold' which draws the line separating target and non-target pixels within target maps. The Crossed Array selections for both these parameters favor a more liberal approach to potential target nomination.

Parameter	**Crossed Array Level**	**Combined Array Level**
Dimension Adjust	-2	-2
Max Score Threshold	6	6
Bin Width SNR	**0.06**	**0.1**
PT SNR Threshold	**3.5**	**6**
Bin Width Indentify	0.1	0.1
Smooth Iterations High	150	150
Smooth Iterations Low	**25**	**5**
Low SNR	**4**	**14**
Window Size	**5**	**4**
Threshold Both Sides	1	1
Clean Signal	**1**	**0**

Table 4.14 Control Factor Level Differences between Crossed and Combined Array Techniques

The four remaining parameters are all related in that the first three: 'Smooth Iterations Low', 'Low SNR', and 'Window Size' are only used if 'Clean Signal' is set to 1. Therefore, the 'Clean Signal' setting suggested by the Combined Array analysis renders the other three parameters' settings irrelevant, and their suggested settings are secondary effects from other parameters influencing them through the test design framework.

Comparing the performance statistics from the two RPD techniques reveals only slight differences in performance in any one response, and neither technique outperformed the other for every response. The Combined Array setting was an average of ∼0.26 seconds faster and produced ∼1% greater TPF than the Crossed Array setting. However, the Crossed Array setting produced a slightly smaller variance with regard to TPF. Additionally, the Crossed Array setting outperformed the Combined Array on FPF by about 0.1% and TFP by almost 7%. The variance of these two response was also slightly lower with the Crossed Array than the Combined Array setting. The overall differences in performance between the two sets of parameter settings are small enough that, even though a rigorous multivariate analysis was not performed, they can be said to be insignificant. However, since

Parameter	Johnson's Level
Dimension Adjust	0
Max Score Threshold	10
Bin Width SNR	0.05
PT SNR Threshold	2
Bin Width Indentify	0.05
Smooth Iterations High	100
Smooth Iterations Low	20
Low SNR	10
Window Size	3
Threshold Both Sides	0
Clean Signal	1

Table 4.15 Johnson's Suggested Control Factor Levels

the second question from the previous list should be answered, the Time difference was transformed into a percentage to provide some objective method of comparison. The Combined Array settings were ∼1.6% faster than the Crossed Array. This combined with the 1% advantage in TPF was compared to the ∼7.1% advantage of the Crossed Array from FPF and TFP. The results of the performance comparison show the Crossed Array settings provide better, more robust algorithm performance than the Combined Array settings. The most intuitive reason for enhanced performance from the Crossed Array settings is the difference in design sizes. The Crossed Array's design is a full order of magnitude larger than the Combined Array design resulting in enhanced resolution of the control×response interaction.

The final question is whether or not the parameters suggested by the RPD techniques improve performance over Johnson's suggested settings. The settings suggested by Johnson [5] are given in Table 4.15.

Comparing these settings to those suggested by the RPDs, Johnson's recommendations match those of the RPD for only one control, 'Clean Signal'. Furthermore, this setting is only matched by the Crossed Array and it is one of two binary variables, making the intersection likelihood rather high.

	Johnson Settings Statistics							
	Time		TPF		FPF		TFP	
Image	Mean	Variance	Mean	Variance	Mean	Variance	Mean	Variance
ARES 1C	1.5710	0.1043	1	0	0	0	1	0
ARES 1D	5.5502	0.2338	0.84	0	0.0023	1.44×10^{-07}	0.6125	0.0015
ARES 1F	4.2262	0.5895	0.9623	1.27×10^{-16}	0.0017	4.84×10^{-22}	0.9563	2.54×10^{-16}
ARES 2C	3.5078	0.0782	1	0	0.0056	1.24×10^{-06}	0	0
ARES 2D	2.9759	0.1232	0.9085	6.85×10^{-06}	0.0003	5.14×10^{-08}	0.9889	7.07×10^{-05}
ARES 2F	122.61	0.4541	0.9704	3.43×10^{-06}	0.0025	1.28×10^{-06}	0.7772	0.0053
ARES 3F	5.1454	0.4610	0.8456	5.65×10^{-05}	0.0004	1.25×10^{-09}	0.9242	4.16×10^{-06}
ARES 4F	27.538	0.3373	0.8441	0	0.0037	1.15×10^{-06}	0.7272	0.0029
Total	21.640	1542.2	0.9214	0.0044	0.0021	3.71×10^{-06}	0.7483	0.0995

Table 4.16 Mean and Variances from Johnson Verification Experiment

Comparing the statistics in Table 4.16 with those in Tables 4.12 and 4.13 shows significant differences in mean response between Johnson and the RPDs. First, Johnson's settings yield an average Time response approximately 6 seconds higher than those of the RPDs indicating an improvement in average algorithm run time with RPD. However, Johnson's settings produced an average TPF over 20% higher than either of the RPDs. FPF was slightly higher using Johnson's settings, but all of the FPFs are very small with virtually no variance. Finally, Johnson's settings produced an average TFP lower than the Crossed Array, but higher than Combined Array settings.

These results suggest that while the RPDs did not enhance performance in each response category, neither did they degrade overall algorithm performance. The differences in performance observed in the Time and TPF responses are most likely the result of the objective functions given in Eq.'s 3.10 and 3.11. Recall these equations give equal weight to each of the four responses. These weightings are key to driving the algorithm toward a response(s) of interest. For this particular analysis, no user input was available in terms of required analysis time or minimum TPF, so each of the responses was treated as equally important. From the results

shown in Table 4.16 it seems apparent that Johnson was somewhat more concerned with TPF than Time. In other words, his objective function, had it been explicitly stated, would have a larger weight on TPF than on the Time response.

In conclusion, the relative equality of performance demonstrated by the suggested settings from the RPD techniques combined with the large variation in design size and the additional system level insight gained by generating mean and variance models leads to selection of the Combined Array RSM technique as preferable to Taguchi's Crossed Array method.

5. Conclusions

This final chapter reviews the previous four, summarizes the contributions of the research efforts, and suggests possible future research areas.

5.1 Review

Chapter 1 began by introducing remote sensing, specifically the proliferation of hyperspectral technology and the analysis problems it creates. A previously developed method, AutoGAD, is introduced as potential piece of future analysis techniques, but has not yet evolved into a real time analysi tool ready for deployment. Design of Experiments, specifically Robust Parameter Design, is proposed as a technique for improving AutoGAD's capability. Finally, the location of robust operating parameters via two distinct RPD methods was presented as the overarching research goal.

Chapter 2 provided a short description of hyperspectral imagery as well as common techniques for analysis of HSI. This was followed by an overview of the AutoGAD algorithm developed by Johnson for autonomous detection of anomalous pixels within HSI. Robust Parameter Design's history, application, and techniques were discussed. This discussion included development of the mathematical basis for two separate RPD techniques: Taguchi's Method, or Crossed Arrays; and Response Surface Methods, or Combined Arrays.

Chapter 3 cast AutoGAD as a RPD problem. Inputs (controls and noise) were developed as well as responses to quantify algorithm performance. These variables were then employed to develop RPDs for AutoGAD using both Crossed and Combined Array approaches. Finally, the dimensionality of the response space was reduced using standardization and a simple linear program.

Chapter 4 provided detailed analysis of the experimental results. Both RPD techniques were described in detail with regard to their application to AutoGAD. The results from both designed experiments were presented along with analysis of these results. The suggested robust parameter settings were provided and then compared using a verification experiment. This experiment included a comparison of both RPD techniques to Johnson's suggested settings. Finally, the results of the verification were presented and techniques' performances were compared to each other and to the performance of Johnson's settings.

5.2 Research Contributions

The list given below summarizes the contributions to the body of knowledge made by this research:

- Developed Methodology for evaluating new evolutions of AutoGAD.
- RPD can provide better settings, or at least match the performance of settings suggested by algorithm creators by giving flexibility to the end-user through objective function weight manipulation.
- RPD has been shown as a viable technique for enhancing anomaly detection algorithm performance. It is reasonable to assume the techniques are extensible to other types of algorithms.
- Conducted head-to-head comparison of two distinct RPD techniques; forming and supporting conclusions about which technique is better suited to problems of similar type and size.
- Developed a method for reducing the dimensionality of the response space for multi-objective problems. Specifically, standardizing response data to enable creation of a simple, one-dimensional objective function where all responses of interest become terms of a linear combination.

5.3 Future Research

- Conduct a large scale validation experiment using different imagery collected at different times, using different sensors and targets/backgrounds.
- The low R^2 of the Combined Array model suggests misspecification. Employ different model generation techniques to locate robust parameter settings, *i.e.* Neural Networks.
- Develop a more sophisticated heuristic for selection of significant parameters. These heuristics can be used within both techniques to decide which parameters will adjust mean response and which will be used to reduce response variation.

Bibliography

1. Box, George. "Signal-to-Noise Ratios, Performance Criteria, and Transformations," *Technometrics*, *30*(1):1–17 (February 1988).

2. Brenneman, William and William Myers. "Robust Parameter Design with Categorical Noise Variables," *Journal of Quality Technology*, *35*(4):335–341 (2003).

3. Dillon, William R. and Matthew Goldstein. *Multivariate Analysis Methods and Applications*. New York: John Wiley and Sons, Inc., 1984.

4. Hooker, J. N. "Testing Heuristics: We Have It All Wrong," *Journal of Heuristics*, *1*:33–42 (May 1995).

5. Johnson, Robert J. *Improved Feature Extraction, Feature Selection, and Identification Techniques that Create a Fast Unsupervised Hyperspectral Target Detection Algorithm*. MS thesis, AIR FORCE INSTITUTE OF TECHNOLOGY, Wright-Patterson Air Force Base, Ohio, March 2008.

6. Landgrebe, David A. *Signal Theory Methods in Multispectral Remote Sensing* (1st Edition). John Wiley and Sons, Inc., 2003.

7. Miller, Michael K. *Exploitation of Intra-Spectral Band Correlation for Rapid Feature Selection, And Target Identification in Hyperspectral Imagery*. Thesis, AIR FORCE INSTITUTE OF TECHNOLOGY, 2950 Hobson Way, Wright-Patterson Air Force Base, OH, March 2009.

8. Montgomery, Douglas C. *Design and Analysis of Experiments* (6th Edition). John Wiley and Sons, Inc., 2005.

9. Myers, Raymond H., et al. "Response Surface Alternatives to the Taguchi Robust Parameter Design Approach," *The American Statistician*, *46*(2):131–139 (May 1992).

10. Myers, Raymond H. and Douglas C. Montgomery. *Response Surface Methodology* (2nd Edition). John Wiley and Sons, Inc., 2002.

11. Shaw, Gary and Dimitris Manolakis. "Signal Processing for Hyperspectral Image Exploitation," *IEEE Signal Processing Magazine*, *19*(1):12–16 (January 2002).

12. Smetek, Timothy E. *Hyperspectral Imagery Target Detection Using Improved Anomaly Detection and Signature Matching Methods*. Dissertation, AIR FORCE INSTITUTE OF TECHNOLOGY, 2950 Hobson Way, Wright-Patterson Air Force Base, OH, August 2007.

13. Smetek, Timothy E. and Kenneth W. Bauer Jr. "A comparison of Multivariate Outlier Detection Methods For Finding Hyperspectral Anomalies," *Military Operations Research*, *13*(3) (2008).

14. Southey, Robert. *The Doctor, Etc., 2*. Kessinger Publishing, LLC, June 2008.

15. Stein, David W. J., et al. “Anomaly Detection From Hyperspectral Imagery,” *IEEE Signal Processing Magazine*, 58–69 (January 2002).

16. Tsui, Kwok-Leung. “A critical look at Taguchi’s modelling approach for robust design,” *Journal of Applied Statistics*, *23*(1):81–95 (1996).

Appendix A. Additional Data Tables and Analysis from the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 1)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
1	2	6	0.01	6	0.1	50	5	4	1	1	0	1	13.1776	0	0	0	-0.22474	-1.91807	-0.43401	-1.32603
2	2	6	0.1	1	0.1	50	45	14	9	1	0	1	2.0119	0.8194	0.0041	0.6413	-0.51211	0.297434	-0.25171	0.24601
3	2	14	0.01	6	0.1	50	5	14	9	1	0	1	3.8542	0	0	0	-0.46469	-1.91807	-0.43401	-1.32603
4	2	14	0.1	1	0.1	150	45	4	9	1	0	1	7.8086	0.2298	0.0006	0.6	-0.36292	-1.29674	-0.40733	0.14477
5	2	14	0.01	1	0.1	50	5	4	9	1	0	1	14.9828	0	0	0	-0.17828	-1.91807	-0.43401	-1.32603
6	-2	6	0.01	1	0.1	150	5	14	9	1	0	1	10.4432	0	0	0	-0.29511	-1.91807	-0.43401	-1.32603
7	2	6	0.1	6	0.1	150	5	14	9	1	0	1	2.8327	0.75	0.0013	0.7303	-0.49098	0.109789	-0.37621	0.464178
8	2	14	0.1	6	0.1	150	5	4	1	1	0	1	3.8392	1	0.0012	0	-0.46508	0.785743	-0.38065	-1.32603
9	2	6	0.01	6	0.01	50	45	4	9	1	0	1	20.2714	0	0	0	-0.04217	-1.91807	-0.43401	-1.32603
10	2	6	0.01	6	0.01	150	5	14	1	1	0	1	1.9932	0.9415	0.0012	0.9516	-0.51259	0.62757	-0.38065	1.006656
11	-2	14	0.01	1	0.1	150	5	4	1	1	0	1	2.6285	1	0.004	0	-0.49624	0.785743	-0.25616	-1.32603
12	-2	6	0.1	1	0.01	50	5	14	1	1	0	1	4.8055	0.8696	0.0044	0.5072	-0.44021	0.433165	-0.23837	-0.08271
13	-2	14	0.1	1	0.1	50	5	14	9	1	0	1	112.0733	0	0	0	2.320493	-1.91807	-0.43401	-1.32603
14	2	14	0.1	6	0.01	150	45	4	9	1	0	1	1.9084	1	0	1	-0.51477	0.785743	-0.43401	1.125301
15	-2	6	0.01	6	0.01	150	45	14	9	1	0	1	101.7496	0.9649	0.0566	0.1182	2.054797	0.690839	2.082596	-1.03628
16	2	14	0.01	1	0.01	150	45	4	1	1	0	1	3.9023	0.8352	0.0195	0.1626	-0.46345	0.340154	0.43302	-0.92744
17	-2	14	0.01	6	0.01	150	45	14	1	1	0	1	1.3927	1	0	1	-0.52804	0.785743	-0.43401	1.125301
18	2	14	0.01	6	0.1	150	45	14	1	1	0	1	1.2262	1	0	1	-0.53233	0.785743	-0.43401	1.125301
19	2	6	0.1	1	0.01	50	5	4	1	1	0	1	1.2353	1	0	1	-0.53209	0.785743	-0.43401	1.125301
20	-2	6	0.1	1	0.01	150	45	4	9	1	0	1	1.1623	1	0	1	-0.53397	0.785743	-0.43401	1.125301
21	-2	6	0.1	1	0.1	150	5	4	1	1	0	1	1.9752	1	0.0002	0	-0.51305	0.785743	-0.42512	-1.32603
22	2	6	0.01	6	0.01	150	5	4	9	1	0	1	5.28	0	0	0	-0.428	-1.91807	-0.43401	-1.32603
23	2	14	0.01	1	0.01	150	5	14	9	1	0	1	5.4989	0.9428	0.0017	0.9539	-0.42236	0.631085	-0.35842	1.012294
24	-2	6	0.01	1	0.1	150	45	14	1	1	0	1	3.3528	1	0	1	-0.4776	0.785743	-0.43401	1.125301
25	-2	14	0.01	1	0.01	150	45	4	9	1	0	1	3.6689	0.0851	0.0005	0.3922	-0.46946	-1.68798	-0.41178	-0.36462
26	-2	6	0.01	6	0.1	150	45	4	9	1	0	1	114.885	0.8845	0.0063	0.4932	2.392856	0.473452	-0.15389	-0.11703
27	2	6	0.01	1	0.01	50	5	14	9	1	0	1	24.6365	1	0	1	0.070173	0.785743	-0.43401	1.125301
28	-2	6	0.1	6	0.1	150	45	14	9	1	0	1	3.0996	0.8439	0.0003	0.9891	-0.48411	0.363677	-0.42067	1.098581
29	-2	14	0.1	1	0.01	50	5	4	1	1	0	1	3.7952	0.4479	0	0.9978	-0.46621	-0.70703	-0.43401	1.119908
30	-2	6	0.1	6	0.01	150	45	4	1	1	0	1	3.4206	0.1578	0	1	-0.47585	-1.49141	-0.43401	1.125301
31	2	14	0.1	1	0.01	50	45	4	9	1	0	1	1.1463	1	0	1	-0.53438	0.785743	-0.43401	1.125301
32	-2	14	0.1	6	0.01	50	45	14	9	1	0	1	64.6679	0.9371	0.0788	0.0637	1.100442	0.615673	3.069674	-1.16988
33	-2	14	0.1	6	0.1	50	5	14	1	1	0	1	114.9218	0.9083	0.0109	0.3744	2.393804	0.537803	0.050638	-0.40825
34	2	6	0.01	1	0.01	50	45	14	1	1	0	1	4.4663	0.941	0.0017	0.9531	-0.44894	0.626218	-0.35842	1.010333
35	2	6	0.1	6	0.1	150	45	4	1	1	0	1	3.3109	0	0	0	-0.47867	-1.91807	-0.43401	-1.32603
36	-2	14	0.1	6	0.01	150	5	14	9	1	0	1	25.7124	1	0	1	0.097863	0.785743	-0.43401	1.125301
37	-2	14	0.01	1	0.1	50	45	14	9	1	0	1	3.1298	0.9331	0.0255	0.6244	-0.48334	0.604858	0.699798	0.204582
38	-2	14	0.01	6	0.01	50	5	4	9	1	0	1	4.0474	0.7892	0.0003	0.9481	-0.45972	0.215778	-0.42067	0.998077
39	2	14	0.1	6	0.1	50	45	4	1	1	0	1	114.4513	0.9732	0.1379	0.0581	2.381695	0.713281	5.697436	-1.1836
40	-2	6	0.01	6	0.1	50	45	14	1	1	0	1	4.5646	0.8826	0.0018	0.9474	-0.44641	0.468315	-0.35397	0.996361
41	-2	6	0.1	1	0.1	50	45	4	1	1	0	1	2.8429	0.7487	0.0028	0.7644	-0.49072	0.106274	-0.30951	0.547768
42	2	14	0.1	6	0.01	50	5	14	1	1	0	1	1.2173	1	0	1	-0.53256	0.785743	-0.43401	1.125301
43	-2	6	0.01	1	0.01	50	5	4	1	1	0	1	5.9812	0.7892	0.0005	0.9068	-0.40995	0.215778	-0.41178	0.896837
44	-2	6	0.1	6	0.1	50	5	4	9	1	0	1	3.7297	0	0	0	-0.4679	-1.91807	-0.43401	-1.32603
45	2	14	0.1	1	0.01	150	45	14	1	1	0	1	115.7943	0.9042	0.0027	0.7056	2.416259	0.526717	-0.31396	0.40363
46	2	14	0.01	1	0.1	50	5	14	1	1	0	1	3.5526	0.9217	0.0022	0.9398	-0.47245	0.574034	-0.33619	0.977731
47	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	1	122.4336	0.9207	0.0073	0.6552	2.587131	0.57133	-0.10943	0.280083
48	2	10	0.055	3.5	0.055	100	25	9	5	1	0	1	6.3808	0.9439	0.1165	0.0494	-0.39967	0.634059	4.745929	-1.20493
49	0	6	0.055	3.5	0.055	100	25	9	5	1	0	1	1.6765	1	0	1	-0.52074	0.785743	-0.43401	1.125301
50	0	14	0.055	3.5	0.055	100	25	9	5	1	0	1	3.1461	0.6201	0.0057	0.7995	-0.48292	-0.24144	-0.18057	0.63381
51	0	10	0.01	3.5	0.055	100	25	9	5	1	0	1	5.9297	0.9428	0.0017	0.9539	-0.41128	0.631085	-0.35842	1.012294
52	0	10	0.1	3.5	0.055	100	25	9	5	1	0	1	2.9791	0.7661	0.0012	0.7798	-0.48721	0.15332	-0.38065	0.585518
53	0	10	0.055	1	0.055	100	25	9	5	1	0	1	6.4238	0.3362	0.0019	0.4202	-0.39856	-1.00905	-0.34953	-0.29598
54	0	10	0.055	6	0.055	100	25	9	5	1	0	1	4.2979	0	0	0	-0.45327	-1.91807	-0.43401	-1.32603
55	0	10	0.055	3.5	0.01	100	25	9	5	1	0	1	89.8928	0.7045	0.009	0.3875	1.749644	-0.01323	-0.03384	-0.37614
56	0	10	0.055	3.5	0.1	100	25	9	5	1	0	1	116.9492	0.9535	0.0033	0.7467	2.445982	0.660015	-0.28728	0.504379
57	0	10	0.055	3.5	0.055	50	25	9	5	1	0	1	4.8267	0	0.0065	0	-0.43966	-1.91807	-0.145	-1.32603
58	0	10	0.055	3.5	0.055	150	25	9	5	1	0	1	2.6143	0.9561	0.0056	0.8669	-0.4966	0.667045	-0.18502	0.799029
59	0	10	0.055	3.5	0.055	100	5	9	5	1	0	1	2.9985	1	0.0602	0	-0.48671	0.785743	2.242663	-1.32603
60	0	10	0.055	3.5	0.055	100	45	9	5	1	0	1	2.6099	0.7971	0.0052	0.567	-0.49672	0.237139	-0.2028	0.063876
61	0	10	0.055	3.5	0.055	100	25	4	5	1	0	1	4.0406	1	0.0049	0	-0.45989	0.785743	-0.21614	-1.32603
62	0	10	0.055	3.5	0.055	100	25	14	5	1	0	1	2.2676	1	0	1	-0.50553	0.785743	-0.43401	1.125301
63	0	10	0.055	3.5	0.055	100	25	9	1	1	0	1	5.6479	0.8469	0.0238	0.6457	-0.41853	0.371789	0.624211	0.256795
64	0	10	0.055	3.5	0.055	100	25	9	9	1	0	1	4.442	1	0.0072	0	-0.44956	0.785743	-0.11387	-1.32603

65	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	1.2743	1	0	1	-0.53109	0.785743	-0.43401	1.125301
66	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	2.9349	0.75	0.0048	0.6176	-0.48835	0.109789	-0.22059	0.187913
67	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	2.4358	0.7558	0.0014	0.8497	-0.5012	0.125471	-0.37176	0.756866
68	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	123.9118	0.9541	0.0051	0.6361	2.625175	0.661638	-0.20725	0.233263
69	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	2.3699	0.9131	0.0011	0.9537	-0.50289	0.550781	-0.3851	1.011804
70	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	4.8675	0.8385	0.0021	0.6818	-0.43861	0.349077	-0.34064	0.345288
71	2	6	0.01	6	0.1	50	5	4	1	0	0	1	3.1662	0.9021	0.0004	0.986	-0.4824	0.521039	-0.41622	1.090982
72	2	6	0.1	1	0.1	50	45	14	9	0	0	1	121.2711	0.9167	0.0142	0.3153	2.557213	0.560515	0.197366	-0.55312
73	2	14	0.01	6	0.1	50	5	14	9	0	0	1	3.9173	1	0.0048	0	-0.46307	0.785743	-0.22059	-1.32603
74	2	14	0.1	1	0.1	150	45	4	9	0	0	1	1.7825	0.956	0.1001	0.0968	-0.51801	0.666775	4.016736	-1.08874
75	2	14	0.01	1	0.1	50	5	4	9	0	0	1	25.6992	1	0.0033	0	0.097523	0.785743	-0.28728	-1.32603
76	-2	6	0.01	1	0.1	150	5	14	9	0	0	1	2.2955	0.9452	0.0015	0.9436	-0.50481	0.637574	-0.36731	0.987046
77	2	6	0.1	6	0.1	150	5	14	9	0	0	1	3.9136	0.8368	0.0022	0.7004	-0.46316	0.34448	-0.33619	0.390883
78	2	14	0.1	6	0.1	150	5	4	1	0	0	1	3.6817	0.9664	0.0075	0.8313	-0.46913	0.694895	-0.10054	0.711762
79	2	6	0.01	6	0.01	50	45	4	9	0	0	1	114.8904	0.9694	0.0368	0.1801	2.392995	0.703006	1.202229	-0.88454
80	2	6	0.01	6	0.01	150	5	14	1	0	0	1	4.0117	0.4847	0.0003	0.8876	-0.46064	-0.60753	-0.42067	0.849771
81	-2	14	0.01	1	0.1	150	5	4	1	0	0	1	3.713	0.8275	0.0253	0.1263	-0.46833	0.319335	0.690905	-1.01642
82	-2	6	0.1	1	0.01	50	5	14	1	0	0	1	3.3966	0.4479	0	0.9978	-0.47647	-0.70703	-0.43401	1.119908
83	-2	14	0.1	1	0.1	50	5	14	9	0	0	1	3.3589	0.6218	0.0029	0.4669	-0.47744	-0.23684	-0.30507	-0.1815
84	2	14	0.1	6	0.01	150	45	4	9	0	0	1	64.608	0.873	0.0929	0.0721	1.098901	0.442358	3.696602	-1.14929
85	-2	6	0.01	6	0.01	150	45	14	9	0	0	1	3.2039	0.8825	0.0018	0.9483	-0.48143	0.468044	-0.35397	0.998567
86	2	14	0.01	1	0.01	150	45	4	1	0	0	1	5.1726	0	0	0	-0.43076	-1.91807	-0.43401	-1.32603
87	-2	14	0.01	6	0.01	150	45	14	1	0	0	1	2.5012	0.851	0.0004	0.9807	-0.49951	0.382874	-0.41622	1.07799
88	2	14	0.01	6	0.1	150	45	14	1	0	0	1	6.2126	0	0.0011	0	-0.40399	-1.91807	-0.3851	-1.32603
89	2	6	0.1	1	0.01	50	5	4	1	0	0	1	4.0849	0.8432	0.0001	0.9963	-0.45875	0.361785	-0.42956	1.116231
90	-2	6	0.1	1	0.01	150	45	4	9	0	0	1	75.2561	0.9271	0.1394	0.0401	1.372946	0.588635	5.764131	-1.22773
91	-2	6	0.1	1	0.1	150	5	4	1	0	0	1	5.0678	0.8696	0.0046	0.4965	-0.43346	0.433165	-0.22948	-0.10894
92	2	6	0.01	6	0.01	150	5	4	9	0	0	1	2.095	1	0.045	0	-0.50997	0.785743	1.566826	-1.32603
93	2	14	0.01	1	0.01	150	5	14	9	0	0	1	1.4592	1	0	1	-0.52633	0.785743	-0.43401	1.125301
94	-2	6	0.01	1	0.1	150	45	14	1	0	0	1	122.0324	0.8333	0.0014	0.8268	2.576806	0.335017	-0.37176	0.700731
95	-2	14	0.01	1	0.01	150	45	4	9	0	0	1	3.1854	0.8826	0.0018	0.9474	-0.4819	0.468315	-0.35397	0.996361
96	-2	6	0.01	6	0.1	150	45	4	9	0	0	1	3.4226	1	0.006	0	-0.4758	0.785743	-0.16723	-1.32603
97	2	6	0.01	1	0.01	50	5	14	9	0	0	1	3.7721	0.4479	0	0.9978	-0.4668	-0.70703	-0.43401	1.119908
98	-2	6	0.1	6	0.1	150	45	14	9	0	0	1	4.0598	0.8268	0.0305	0.1066	-0.4594	0.317442	0.922113	-1.06472
99	-2	14	0.1	1	0.01	50	5	4	1	0	0	1	1.2448	1	0	1	-0.53185	0.785743	-0.43401	1.125301
100	-2	6	0.1	6	0.01	150	45	4	1	0	0	1	2.5082	0.782	0.0121	0.3455	-0.49933	0.196311	0.103994	-0.47909
101	2	14	0.1	1	0.01	50	45	4	9	0	0	1	3.0389	1	0	1	-0.48567	0.785743	-0.43401	1.125301
102	-2	14	0.1	6	0.01	50	45	14	9	0	0	1	7.0427	0	0	0	-0.38263	-1.91807	-0.43401	-1.32603
103	-2	14	0.1	6	0.1	50	5	14	1	0	0	1	113.5641	0.9753	0.0495	0.1451	2.358861	0.718959	1.766909	-0.97034
104	2	6	0.01	1	0.01	50	45	14	1	0	0	1	2.7872	0.6959	0.0011	0.7574	-0.49215	-0.03649	-0.3851	0.530609
105	2	6	0.1	6	0.1	150	45	4	1	0	0	1	5.3592	0.8967	0.0031	0.6371	-0.42596	0.506439	-0.29617	0.235714
106	-2	14	0.1	6	0.01	150	5	14	9	0	0	1	28.7016	0.7784	0.0065	0.5898	0.174794	0.186577	-0.145	0.119766
107	-2	14	0.01	1	0.1	50	45	14	9	0	0	1	3.367	0.6218	0.0022	0.5362	-0.47723	-0.23684	-0.33619	-0.01162
108	-2	14	0.01	6	0.01	50	5	4	9	0	0	1	3.2137	0.9663	0.0053	0.8741	-0.48118	0.694624	-0.19835	0.816679
109	2	14	0.1	6	0.1	50	45	4	1	0	0	1	4.1389	0.7757	0.0114	0.752	-0.45736	0.179277	0.07287	0.517372
110	-2	6	0.01	6	0.1	50	45	14	1	0	0	1	25.8223	1	0	1	0.100691	0.785743	-0.43401	1.125301
111	-2	6	0.1	1	0.1	50	45	4	1	0	0	1	27.4616	0.744	0.0053	0.5924	0.142881	0.093566	-0.19835	0.12614
112	2	14	0.1	6	0.01	50	5	14	1	0	0	1	2.1377	0.7515	0.0008	0.9071	-0.50887	0.113845	-0.39844	0.897572
113	-2	6	0.01	1	0.01	50	5	4	1	0	0	1	34.1786	0	0	0	0.315753	-1.91807	-0.43401	-1.32603
114	-2	6	0.1	6	0.1	50	5	4	9	0	0	1	73.8819	0.8768	0.0038	0.6126	1.337579	0.452633	-0.26505	0.175657
115	2	14	0.1	1	0.01	150	45	14	1	0	0	1	2.3139	1	0	1	-0.50433	0.785743	-0.43401	1.125301
116	2	14	0.01	1	0.1	50	5	14	1	0	0	1	2.6516	0.4195	0.0011	0.9295	-0.49564	-0.78382	-0.3851	0.952482
117	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	1	2.6099	0.9164	0.0081	0.8075	-0.49672	0.559704	-0.07386	0.65342
118	2	10	0.055	3.5	0.055	100	25	9	5	0	0	1	2.9172	0.6959	0.0014	0.7055	-0.48881	-0.03649	-0.37176	0.403385
119	0	6	0.055	3.5	0.055	100	25	9	5	0	0	1	15.7692	0	0	0	-0.15804	-1.91807	-0.43401	-1.32603
120	0	14	0.055	3.5	0.055	100	25	9	5	0	0	1	27.7151	0.8758	0.013	0.3873	0.149405	0.449929	0.14401	-0.37663
121	0	10	0.01	3.5	0.055	100	25	9	5	0	0	1	2.2803	1	0	1	-0.5052	0.785743	-0.43401	1.125301
122	0	10	0.1	3.5	0.055	100	25	9	5	0	0	1	5.1011	0.9428	0.0017	0.9539	-0.4326	0.631085	-0.35842	1.012294
123	0	10	0.055	1	0.055	100	25	9	5	0	0	1	103.3446	0	0	0	2.095847	-1.91807	-0.43401	-1.32603
124	0	10	0.055	6	0.055	100	25	9	5	0	0	1	1.2696	1	0	1	-0.53121	0.785743	-0.43401	1.125301
125	0	10	0.055	3.5	0.01	100	25	9	5	0	0	1	3.6442	0.7799	0.0159	0.3872	-0.4701	0.190633	0.272953	-0.37687
126	0	10	0.055	3.5	0.1	100	25	9	5	0	0	1	3.4184	0.6218	0.0017	0.6016	-0.47591	-0.23684	-0.35842	0.148692
127	0	10	0.055	3.5	0.055	50	25	9	5	0	0	1	2.7417	0.6034	0.0114	0.3686	-0.49332	-0.28659	0.07287	-0.42247
128	0	10	0.055	3.5	0.055	150	25	9	5	0	0	1	5.1318	0.8571	0.0038	0.5412	-0.43181	0.399368	-0.26505	0.000632
129	0	10	0.055	3.5	0.055	100	5	9	5	0	0	1	2.2621	1	0	1	-0.50567	0.785743	-0.43401	1.125301
130	0	10	0.055	3.5	0.055	100	45	9	5	0	0	1	3.4719	0.8826	0.0018	0.9474	-0.47453	0.468315	-0.35397	0.996361
131	0	10	0.055	3.5	0.055	100	25	4	5	0	0	1	157.2884	0	0	0	3.484173	-1.91807	-0.43401	-1.32603
132	0	10	0.055	3.5	0.055	100	25	14	5	0	0	1	9.2282	0	0	0	-0.32638	-1.91807	-0.43401	-1.32603
133	0	10	0.055	3.5	0.055	100	25	9	1	0	0	1	25.6972	1	0	1	0.097471	0.785743	-0.43401	1.125301
134	0	10	0.055	3.5	0.055	100	25	9	9	0	0	1	6.0156	0.8368	0.0026	0.6709	-0.40906	0.34448	-0.3184	0.318569
135	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	1.7539	1	0	1	-0.51875	0.785743	-0.43401	1.125301
136	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	6.4026	0.6489	0.0364	0.1162	-0.3991	-0.16357	1.184444	-1.04118

137	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	1.5595	1	0	1	-0.52375	0.785743	-0.43401	1.125301
138	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	5.4437	0.8509	0.0041	0.5249	-0.42378	0.382604	-0.25171	-0.03932
139	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	1.2754	1	0	1	-0.53106	0.785743	-0.43401	1.125301
140	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	1.1537	1	0	1	-0.53419	0.785743	-0.43401	1.125301
141	2	6	0.01	6	0.1	50	5	4	1	1	1	1	5.8277	0.824	0.0019	0.9422	-0.4139	0.309871	-0.34953	0.983614
142	2	6	0.1	1	0.1	50	45	14	9	1	1	1	4.4922	0.8368	0.002	0.7227	-0.44827	0.34448	-0.34508	0.445548
143	2	14	0.01	6	0.1	50	5	14	9	1	1	1	2.5862	0.8957	0.0007	0.9678	-0.49733	0.503735	-0.40288	1.046368
144	2	14	0.1	1	0.1	150	45	4	9	1	1	1	102.0446	0.9652	0.0792	0.0883	2.062389	0.69165	3.087459	-1.10957
145	2	14	0.01	1	0.1	50	5	4	9	1	1	1	2.0966	1	0	1	-0.50993	0.785743	-0.43401	1.125301
146	-2	6	0.01	1	0.1	150	5	14	9	1	1	1	3.2003	0	0	0	-0.48152	-1.91807	-0.43401	-1.32603
147	2	6	0.1	6	0.1	150	5	14	9	1	1	1	3.6309	0.6218	0.0022	0.5362	-0.47044	-0.23684	-0.33619	-0.01162
148	2	14	0.1	6	0.1	150	5	4	1	1	1	1	2.8171	1	0	1	-0.49138	0.785743	-0.43401	1.125301
149	2	6	0.01	6	0.01	50	45	4	9	1	1	1	2.5616	0.7515	0.0008	0.9071	-0.49796	0.113845	-0.39844	0.897572
150	2	6	0.01	6	0.01	150	5	14	1	1	1	1	2.3877	1	0	1	-0.50243	0.785743	-0.43401	1.125301
151	-2	14	0.01	1	0.1	150	5	4	1	1	1	1	27.7037	0.8774	0.0188	0.3077	0.149112	0.454255	0.401896	-0.57175
152	-2	6	0.1	1	0.01	50	5	14	1	1	1	1	2.8884	0.9255	0.1124	0.0482	-0.48955	0.584309	4.56363	-1.20787
153	-2	14	0.1	1	0.1	50	5	14	9	1	1	1	2.9294	0.5474	0.0037	0.8438	-0.48849	-0.438	-0.2695	0.742403
154	2	14	0.1	6	0.01	150	45	4	9	1	1	1	79.75	0.7076	0.0067	0.4489	1.488603	-0.00485	-0.13611	-0.22563
155	-2	6	0.01	6	0.01	150	45	14	9	1	1	1	1.5229	1	0	1	-0.52469	0.785743	-0.43401	1.125301
156	2	14	0.01	1	0.01	150	45	4	1	1	1	1	2.1123	1	0	1	-0.50952	0.785743	-0.43401	1.125301
157	-2	14	0.01	6	0.01	150	45	14	1	1	1	1	69.1372	0.5771	0.0003	0.9266	1.215467	-0.3577	-0.42067	0.945373
158	2	14	0.01	6	0.1	150	45	14	1	1	1	1	2.6075	1	0	1	-0.49678	0.785743	-0.43401	1.125301
159	2	6	0.1	1	0.01	50	5	4	1	1	1	1	3.6322	0.7816	0.0121	0.7446	-0.47041	0.195229	0.103994	0.499232
160	-2	6	0.1	1	0.01	150	45	4	9	1	1	1	3.6869	0.9663	0.0053	0.8741	-0.469	0.694624	-0.19835	0.816679
161	-2	6	0.1	1	0.1	150	5	4	1	1	1	1	125.7789	0.9569	0.003	0.7482	2.673228	0.669208	-0.30062	0.508056
162	2	6	0.01	6	0.01	150	5	4	9	1	1	1	2.5953	0.7778	0.0026	0.7557	-0.49709	0.184955	-0.3184	0.526441
163	2	14	0.01	1	0.01	150	5	14	9	1	1	1	113.9467	0.8979	0.008	0.443	2.368708	0.509683	-0.0783	-0.24009
164	-2	6	0.01	1	0.1	150	45	14	1	1	1	1	2.6639	1	0.0037	0	-0.49533	0.785743	-0.2695	-1.32603
165	-2	14	0.01	1	0.01	150	45	4	9	1	1	1	3.028	0.6959	0.0013	0.7203	-0.48596	-0.03649	-0.37621	0.439664
166	-2	6	0.01	6	0.1	150	45	4	9	1	1	1	3.9136	1	0.0072	0	-0.46316	0.785743	-0.11387	-1.32603
167	2	6	0.01	1	0.01	50	5	14	9	1	1	1	5.3728	0.9428	0.0017	0.9539	-0.42561	0.631085	-0.35842	1.012294
168	-2	6	0.1	6	0.1	150	45	14	9	1	1	1	11.3238	0	0	0	-0.27245	-1.91807	-0.43401	-1.32603
169	-2	14	0.1	1	0.01	50	5	4	1	1	1	1	2.815	0.782	0.0053	0.5445	-0.49144	0.196311	-0.19835	0.008721
170	-2	6	0.1	6	0.01	150	45	4	1	1	1	1	6.9035	0.4601	0.0017	0.9068	-0.38621	-0.67405	-0.35842	0.896837
171	2	14	0.1	1	0.01	50	45	4	9	1	1	1	6.6189	0	0.0066	0	-0.39354	-1.91807	-0.14055	-1.32603
172	-2	14	0.1	6	0.01	50	45	14	9	1	1	1	3.7582	0.6218	0.0022	0.5362	-0.46716	-0.23684	-0.33619	-0.01162
173	-2	14	0.1	6	0.1	50	5	14	1	1	1	1	2.4981	0.9142	0.0005	0.98	-0.49959	0.553755	-0.41178	1.076274
174	2	6	0.01	1	0.01	50	45	14	1	1	1	1	2.0031	0.9538	0.0544	0.1574	-0.51233	0.660827	1.984778	-0.94019
175	2	6	0.1	6	0.1	150	45	4	1	1	1	1	111.6446	0.9078	0.0127	0.5111	2.30946	0.536451	0.130672	-0.07315
176	-2	14	0.1	6	0.01	150	5	14	9	1	1	1	18.9704	0	0	0	-0.07565	-1.91807	-0.43401	-1.32603
177	-2	14	0.01	1	0.1	50	45	14	9	1	1	1	3.1134	0.8473	0.0001	0.9964	-0.48376	0.37287	-0.42956	1.116476
178	-2	14	0.01	6	0.01	50	5	4	9	1	1	1	119.738	0.905	0.0089	0.4213	2.517756	0.52888	-0.03829	-0.29328
179	2	14	0.1	6	0.1	50	45	4	1	1	1	1	8.3876	0.017	0.015	0.0046	-0.34802	-1.87211	0.232936	-1.31475
180	-2	6	0.01	6	0.1	50	45	14	1	1	1	1	98.8038	0.8598	0.001	0.8598	1.978982	0.406668	-0.38955	0.781625
181	-2	6	0.1	1	0.1	50	45	4	1	1	1	1	2.6935	1	0	1	-0.49456	0.785743	-0.43401	1.125301
182	2	14	0.1	6	0.01	50	5	14	1	1	1	1	3.2112	0.8473	0.0001	0.9964	-0.48124	0.37287	-0.42956	1.116476
183	-2	6	0.01	1	0.01	50	5	4	1	1	1	1	114.0377	0.9752	0.0961	0.0802	2.37105	0.718688	3.838884	-1.12943
184	-2	6	0.1	6	0.1	50	5	4	9	1	1	1	14.408	0	0	0	-0.19307	-1.91807	-0.43401	-1.32603
185	2	14	0.1	1	0.01	150	45	14	1	1	1	1	113.5835	0.8979	0.0073	0.4636	2.35936	0.509683	-0.10943	-0.18959
186	2	14	0.01	1	0.1	50	5	14	1	1	1	1	2.3855	1	0	1	-0.50249	0.785743	-0.43401	1.125301
187	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	1	1.6862	0.8924	0.0005	0.9776	-0.52049	0.494812	-0.41178	1.070391
188	2	10	0.055	3.5	0.055	100	25	9	5	1	1	1	20.6531	0	0	0	-0.03235	-1.91807	-0.43401	-1.32603
189	0	6	0.055	3.5	0.055	100	25	9	5	1	1	1	15.0705	0	0	0	-0.17602	-1.91807	-0.43401	-1.32603
190	0	14	0.055	3.5	0.055	100	25	9	5	1	1	1	3.2967	0.4604	0.0018	0.9028	-0.47904	-0.67324	-0.35397	0.887032
191	0	10	0.01	3.5	0.055	100	25	9	5	1	1	1	14.7668	0	0	0	-0.18384	-1.91807	-0.43401	-1.32603
192	0	10	0.1	3.5	0.055	100	25	9	5	1	1	1	3.6576	0	0	0	-0.46975	-1.91807	-0.43401	-1.32603
193	0	10	0.055	1	0.055	100	25	9	5	1	1	1	98.6556	0.8869	0.0051	0.5492	1.975168	0.479941	-0.20725	0.020242
194	0	10	0.055	6	0.055	100	25	9	5	1	1	1	3.5696	0.8538	0.0001	0.9964	-0.47202	0.390445	-0.42956	1.116476
195	0	10	0.055	3.5	0.01	100	25	9	5	1	1	1	3.0141	0	0	0	-0.48631	-1.91807	-0.43401	-1.32603
196	0	10	0.055	3.5	0.1	100	25	9	5	1	1	1	1.439	1	0	1	-0.52685	0.785743	-0.43401	1.125301
197	0	10	0.055	3.5	0.055	50	25	9	5	1	1	1	1.1777	1	0	1	-0.53358	0.785743	-0.43401	1.125301
198	0	10	0.055	3.5	0.055	150	25	9	5	1	1	1	4.2403	0.8571	0.0038	0.5412	-0.45475	0.399368	-0.26505	0.000632
199	0	10	0.055	3.5	0.055	100	5	9	5	1	1	1	1.9931	0.9545	0.0815	0.1128	-0.51259	0.662719	3.189724	-1.04952
200	0	10	0.055	3.5	0.055	100	45	9	5	1	1	1	3.8547	0.8385	0.002	0.6888	-0.46468	0.349077	-0.34508	0.362448
201	0	10	0.055	3.5	0.055	100	25	4	5	1	1	1	3.2041	0.5267	0.0006	0.8876	-0.48142	-0.49397	-0.40733	0.849771
202	0	10	0.055	3.5	0.055	100	25	14	5	1	1	1	5.3075	0.824	0.0018	0.9461	-0.42729	0.309871	-0.35397	0.993174
203	0	10	0.055	3.5	0.055	100	25	9	1	1	1	1	5.0074	0.8304	0.0181	0.6977	-0.43501	0.327176	0.370772	0.384264
204	0	10	0.055	3.5	0.055	100	25	9	9	1	1	1	137.5998	0.9576	0.0008	0.9206	2.977457	0.671101	-0.39844	0.930665
205	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	5.9362	0.9899	0.0082	0.452	-0.41111	0.758434	-0.06941	-0.21803
206	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	3.1345	1	0	1	-0.48321	0.785743	-0.43401	1.125301
207	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	3.6366	0.7513	0.0643	0.1198	-0.47029	0.113304	2.424961	-1.03236
208	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	2.754	0.8825	0.0018	0.9483	-0.49301	0.468044	-0.35397	0.998567

209	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	3.6955	1	0.0038	0	-0.46878	0.785743	-0.26505	-1.32603
210	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	37.2415	0	0	0	0.394582	-1.91807	-0.43401	-1.32603
211	2	6	0.01	6	0.1	50	5	4	1	0	1	1	3.4882	0	0.0011	0	-0.47411	-1.91807	-0.3851	-1.32603
212	2	6	0.1	1	0.1	50	45	14	9	0	1	1	3.5036	0.8826	0.0007	0.9795	-0.47372	0.468315	-0.40288	1.075048
213	2	14	0.01	6	0.1	50	5	14	9	0	1	1	64.9455	0.7908	0.004	0.5	1.107587	0.220105	-0.25616	-0.10036
214	2	14	0.1	1	0.1	150	45	4	9	0	1	1	2.9729	0.9988	0.0655	0.3738	-0.48737	0.782498	2.478317	-0.40972
215	2	14	0.01	1	0.1	50	5	4	9	0	1	1	3.4241	1	0.0037	0	-0.47576	0.785743	-0.2695	-1.32603
216	-2	6	0.01	1	0.1	150	5	14	9	0	1	1	119.7511	0	0	0	2.518093	-1.91807	-0.43401	-1.32603
217	2	6	0.1	6	0.1	150	5	14	9	0	1	1	2.5549	0.782	0.0033	0.6624	-0.49813	0.196311	-0.28728	0.297733
218	2	14	0.1	6	0.1	150	5	4	1	0	1	1	9.4354	0	0	0	-0.32105	-1.91807	-0.43401	-1.32603
219	2	6	0.01	6	0.01	50	45	4	9	0	1	1	4.9036	0.8509	0.0041	0.5209	-0.43768	0.382604	-0.25171	-0.04913
220	2	6	0.01	6	0.01	150	5	14	1	0	1	1	2.4401	1	0	1	-0.50109	0.785743	-0.43401	1.125301
221	-2	14	0.01	1	0.1	150	5	4	1	0	1	1	4.9733	0.6082	0.0015	0.6887	-0.43589	-0.27361	-0.36731	0.362203
222	-2	6	0.1	1	0.01	50	5	14	1	0	1	1	113.9284	0.8906	0.0063	0.4949	2.368237	0.489945	-0.15389	-0.11286
223	-2	14	0.1	1	0.1	50	5	14	9	0	1	1	4.6927	1	0.0048	0	-0.44311	0.785743	-0.22059	-1.32603
224	2	14	0.1	6	0.01	150	45	4	9	0	1	1	1.4924	0.9548	0.0836	0.1107	-0.52548	0.66353	3.283097	-1.05466
225	-2	6	0.01	6	0.01	150	45	14	9	0	1	1	1.1657	1	0	1	-0.53388	0.785743	-0.43401	1.125301
226	2	14	0.01	1	0.01	150	45	4	1	0	1	1	2.7212	0.6959	0.0013	0.7153	-0.49385	-0.03649	-0.37621	0.427408
227	-2	14	0.01	6	0.01	150	45	14	1	0	1	1	2.1266	0.7885	0.0053	0.5885	-0.50915	0.213886	-0.19835	0.11658
228	2	14	0.01	6	0.1	150	45	14	1	0	1	1	5.572	0.941	0.0017	0.9531	-0.42048	0.626218	-0.35842	1.010333
229	2	6	0.1	1	0.01	50	5	4	1	0	1	1	116.2332	0.9312	0.0013	0.8523	2.427554	0.59972	-0.37621	0.76324
230	-2	6	0.1	1	0.01	150	45	4	9	0	1	1	3.557	0	0	0	-0.47234	-1.91807	-0.43401	-1.32603
231	-2	6	0.1	1	0.1	150	5	4	1	0	1	1	5.1122	0.8852	0.0211	0.2007	-0.43232	0.475345	0.504161	-0.83405
232	2	6	0.01	6	0.01	150	5	4	9	0	1	1	3.5319	0.492	0.0018	0.9099	-0.47299	-0.5878	-0.35397	0.904436
233	2	14	0.01	1	0.01	150	5	14	9	0	1	1	115.2914	0.9107	0.0154	0.2965	2.403316	0.544292	0.250722	-0.59921
234	-2	6	0.01	1	0.1	150	45	14	1	0	1	1	1.7341	0.9854	0.0267	0.5383	-0.51926	0.746267	0.753153	-0.00648
235	-2	14	0.01	1	0.01	150	45	4	9	0	1	1	105.3759	0.9187	0.0125	0.5236	2.148125	0.565923	0.121779	-0.04251
236	-2	6	0.01	6	0.1	150	45	4	9	0	1	1	4.956	0.9544	0.0055	0.902	-0.43634	0.662449	-0.18946	0.885071
237	2	6	0.01	1	0.01	50	5	14	9	0	1	1	4.1703	1	0.0039	0	-0.45656	0.785743	-0.2606	-1.32603
238	-2	6	0.1	6	0.1	150	45	14	9	0	1	1	26.5067	0.8758	0.0164	0.335	0.118305	0.449929	0.295185	-0.50483
239	-2	14	0.1	1	0.01	50	5	4	1	0	1	1	15.8938	0	0	0	-0.15483	-1.91807	-0.43401	-1.32603
240	-2	6	0.1	6	0.01	150	45	4	1	0	1	1	5.2205	0.9428	0	1	-0.42953	0.631085	-0.43401	1.125301
241	2	14	0.1	1	0.01	50	45	4	9	0	1	1	1.215	1	0	1	-0.53262	0.785743	-0.43401	1.125301
242	-2	14	0.1	6	0.01	50	45	14	9	0	1	1	4.1411	0.8268	0.0249	0.1277	-0.45731	0.317442	0.67312	-1.01299
243	-2	14	0.1	6	0.1	50	5	14	1	0	1	1	1.197	1	0	1	-0.53308	0.785743	-0.43401	1.125301
244	2	6	0.01	1	0.01	50	45	14	1	0	1	1	83.0619	0.7352	0.0127	0.3246	1.57384	0.069772	0.130672	-0.53033
245	2	6	0.1	6	0.1	150	45	4	1	0	1	1	3.1367	0.9683	0.037	0.5167	-0.48316	0.700032	1.211122	-0.05943
246	-2	14	0.1	6	0.01	150	5	14	9	0	1	1	4.497	0.8385	0.002	0.6888	-0.44815	0.349077	-0.34508	0.362448
247	-2	14	0.01	1	0.1	50	45	14	9	0	1	1	26.4659	0.8758	0.0164	0.335	0.117255	0.449929	0.295185	-0.50483
248	-2	14	0.01	6	0.01	50	5	4	9	0	1	1	5.3772	0.9544	0.0055	0.902	-0.4255	0.662449	-0.18946	0.885071
249	2	14	0.1	6	0.1	50	45	4	1	0	1	1	98.8065	0.8869	0.0011	0.843	1.979052	0.479941	-0.3851	0.740442
250	-2	6	0.01	6	0.1	50	45	14	1	0	1	1	69.6294	0.6278	0.0003	0.9339	1.228134	-0.22062	-0.42067	0.963268
251	-2	6	0.1	1	0.1	50	45	4	1	0	1	1	2.6986	0.4636	0.0014	0.9228	-0.49443	-0.66458	-0.37176	0.936058
252	2	14	0.1	6	0.01	50	5	14	1	0	1	1	4.895	0.6218	0.0017	0.6016	-0.43791	-0.23684	-0.35842	0.148692
253	-2	6	0.01	1	0.01	50	5	4	1	0	1	1	2.609	1	0	1	-0.49674	0.785743	-0.43401	1.125301
254	-2	6	0.1	6	0.1	50	5	4	9	0	1	1	3.429	0.1192	0	1	-0.47563	-1.59578	-0.43401	1.125301
255	2	14	0.1	1	0.01	150	45	14	1	0	1	1	18.6557	0	0	0	-0.08375	-1.91807	-0.43401	-1.32603
256	2	14	0.01	1	0.1	50	5	14	1	0	1	1	25.7072	1	0	1	0.097729	0.785743	-0.43401	1.125301
257	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	1	5.5824	0.8368	0.0023	0.6974	-0.42021	0.34448	-0.33174	0.383529
258	2	10	0.055	3.5	0.055	100	25	9	5	0	1	1	5.7245	0.3362	0.0019	0.4202	-0.41656	-1.00905	-0.34953	-0.29598
259	0	6	0.055	3.5	0.055	100	25	9	5	0	1	1	27.5057	0.7701	0.006	0.5975	0.144016	0.164136	-0.16723	0.138641
260	0	14	0.055	3.5	0.055	100	25	9	5	0	1	1	28.6668	0.717	0.0021	0.7703	0.173899	0.020563	-0.34064	0.562231
261	0	10	0.01	3.5	0.055	100	25	9	5	0	1	1	6.3856	0.3362	0.0019	0.4202	-0.39954	-1.00905	-0.34953	-0.29598
262	0	10	0.1	3.5	0.055	100	25	9	5	0	1	1	2.5656	0.5754	0.0149	0.5862	-0.49786	-0.3623	0.22849	0.110941
263	0	10	0.055	1	0.055	100	25	9	5	0	1	1	5.7826	0.8368	0.002	0.7227	-0.41506	0.34448	-0.34508	0.445548
264	0	10	0.055	6	0.055	100	25	9	5	0	1	1	2.4122	0.7971	0.0035	0.6587	-0.5018	0.237139	-0.27839	0.288663
265	0	10	0.055	3.5	0.01	100	25	9	5	0	1	1	7.4857	0	0	0	-0.37123	-1.91807	-0.43401	-1.32603
266	0	10	0.055	3.5	0.1	100	25	9	5	0	1	1	114.0308	0.9742	0.0322	0.1995	2.370872	0.715984	0.9977	-0.83699
267	0	10	0.055	3.5	0.055	50	25	9	5	0	1	1	6.8593	1	0	1	-0.38735	0.785743	-0.43401	1.125301
268	0	10	0.055	3.5	0.055	150	25	9	5	0	1	1	18.3694	0	0	0	-0.09112	-1.91807	-0.43401	-1.32603
269	0	10	0.055	3.5	0.055	100	5	9	5	0	1	1	4.7547	0.0681	0.0289	0.0095	-0.44152	-1.73394	0.850972	-1.30274
270	0	10	0.055	3.5	0.055	100	45	9	5	0	1	1	105.8576	0.9247	0.0027	0.7335	2.160522	0.582145	-0.31396	0.472022
271	0	10	0.055	3.5	0.055	100	25	4	5	0	1	1	1.9983	0.8264	0.0057	0.5613	-0.51246	0.31636	-0.18057	0.049903
272	0	10	0.055	3.5	0.055	100	25	14	5	0	1	1	2.4405	0.4195	0.0011	0.9295	-0.50108	-0.78382	-0.3851	0.952482
273	0	10	0.055	3.5	0.055	100	25	9	1	0	1	1	3.4255	1	0.004	0	-0.47573	0.785743	-0.25616	-1.32603
274	0	10	0.055	3.5	0.055	100	25	9	9	0	1	1	5.4053	0.7892	0.0003	0.9481	-0.42477	0.215778	-0.42067	0.998077
275	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	3.5601	0	0	0	-0.47226	-1.91807	-0.43401	-1.32603
276	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	2.6964	0.8587	0.0009	0.9605	-0.49449	0.403694	-0.39399	1.028473
277	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	12.5854	0.9612	0.0082	0.4728	-0.23998	0.680835	-0.06941	-0.16704
278	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	2.1091	0.8953	0.0007	0.9677	-0.5096	0.502653	-0.40288	1.046123
279	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	2.5658	0.8757	0.0006	0.9728	-0.49785	0.449659	-0.40733	1.058625
280	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	3.3472	0.6218	0.0019	0.5759	-0.47774	-0.23684	-0.34953	0.085693

Table A.1 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 1) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 2)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
281	2	6	0.01	6	0.1	50	5	4	1	1	0	2	2.6128	1	0	1	-0.49664	0.785743	-0.43401	1.125301
282	2	6	0.1	1	0.1	50	45	14	9	1	0	2	2.22	0.4655	0.0018	0.9044	-0.50675	-0.65945	-0.35397	0.890954
283	2	14	0.01	6	0.1	50	5	14	9	1	0	2	3.7059	0	0	0	-0.46851	-1.91807	-0.43401	-1.32603
284	2	14	0.1	1	0.1	150	45	4	9	1	0	2	4.3897	0	0.0011	0	-0.45091	-1.91807	-0.3851	-1.32603
285	2	14	0.01	1	0.1	50	5	4	9	1	0	2	2.745	1	0	1	-0.49324	0.785743	-0.43401	1.125301
286	-2	6	0.01	1	0.1	150	5	14	9	1	0	2	3.7632	0.4572	0.0001	0.9937	-0.46703	-0.68189	-0.42956	1.109857
287	2	6	0.1	6	0.1	150	5	14	9	1	0	2	7.7178	0	0.0011	0	-0.36526	-1.91807	-0.3851	-1.32603
288	2	14	0.1	6	0.1	150	5	4	1	1	0	2	3.0899	0	0	0	-0.48436	-1.91807	-0.43401	-1.32603
289	2	6	0.01	6	0.01	50	45	4	9	1	0	2	65.6367	0.8052	0.0023	0.6359	1.125376	0.25904	-0.33174	0.232772
290	2	6	0.01	6	0.01	150	5	14	1	1	0	2	119.1528	0.9102	0.0026	0.7119	2.502695	0.54294	-0.3184	0.419073
291	-2	14	0.01	1	0.1	150	5	4	1	1	0	2	2.412	1	0	1	-0.50181	0.785743	-0.43401	1.125301
292	-2	6	0.1	1	0.01	50	5	14	1	1	0	2	2.1214	1	0	1	-0.50929	0.785743	-0.43401	1.125301
293	-2	14	0.1	1	0.1	50	5	14	9	1	0	2	122.9508	0	0	0	2.600442	-1.91807	-0.43401	-1.32603
294	2	14	0.1	6	0.01	150	45	4	9	1	0	2	1.6176	0.8636	0.0005	0.9788	-0.52225	0.416942	-0.41178	1.073333
295	-2	6	0.01	6	0.01	150	45	14	9	1	0	2	4.2794	0.8621	0	1	-0.45375	0.412887	-0.43401	1.125301
296	2	14	0.01	1	0.01	150	45	4	1	1	0	2	3.2134	0.848	0.0003	0.9894	-0.48118	0.374763	-0.42067	1.099317
297	-2	14	0.01	6	0.01	150	45	14	1	1	0	2	2.9714	0.9871	0.0215	0.5964	-0.48741	0.750864	0.521946	0.135945
298	2	14	0.01	6	0.1	150	45	14	1	1	0	2	4.3496	0.6959	0.0013	0.7203	-0.45194	-0.03649	-0.37621	0.439664
299	2	6	0.1	1	0.01	50	5	4	1	1	0	2	1.157	1	0.0018	0	-0.53411	0.785743	-0.35397	-1.32603
300	-2	6	0.1	1	0.01	150	45	4	9	1	0	2	5.9068	0	0.0024	0	-0.41186	-1.91807	-0.3273	-1.32603
301	-2	6	0.1	1	0.1	150	5	4	1	1	0	2	2.1707	1	0	1	-0.50802	0.785743	-0.43401	1.125301
302	2	6	0.01	6	0.01	150	5	4	9	1	0	2	1.8361	0.9538	0.0544	0.1574	-0.51663	0.660827	1.984778	-0.94019
303	2	14	0.01	1	0.01	150	5	14	9	1	0	2	1.243	1	0	1	-0.5319	0.785743	-0.43401	1.125301
304	-2	6	0.01	1	0.1	150	45	14	1	1	0	2	5.1157	0	0	0	-0.43223	-1.91807	-0.43401	-1.32603
305	-2	14	0.01	1	0.01	150	45	4	9	1	0	2	3.3712	1	0.004	0	-0.47712	0.785743	-0.25616	-1.32603
306	-2	6	0.01	6	0.1	150	45	4	9	1	0	2	2.2273	1	0	1	-0.50656	0.785743	-0.43401	1.125301
307	2	6	0.01	1	0.01	50	5	14	9	1	0	2	108.4569	0.8433	0.0001	0.9878	2.227419	0.362055	-0.42956	1.095394
308	-2	6	0.1	6	0.1	150	45	14	9	1	0	2	3.9371	0.6359	0.0618	0.1101	-0.46256	-0.19872	2.313804	-1.05614
309	-2	14	0.1	1	0.01	50	5	4	1	1	0	2	1.8516	1	0	1	-0.51623	0.785743	-0.43401	1.125301
310	-2	6	0.1	6	0.01	150	45	4	1	1	0	2	26.539	0.8758	0.0163	0.3358	0.119136	0.449929	0.290738	-0.50287
311	2	14	0.1	1	0.01	50	45	4	9	1	0	2	1.9706	1	0	1	-0.51317	0.785743	-0.43401	1.125301
312	-2	14	0.1	6	0.01	50	45	14	9	1	0	2	25.7818	1	0	1	0.099649	0.785743	-0.43401	1.125301
313	-2	14	0.1	6	0.1	50	5	14	1	1	0	2	5.2815	0.168	0	1	-0.42796	-1.46383	-0.43401	1.125301
314	2	6	0.01	1	0.01	50	45	14	1	1	0	2	5.1643	0.7486	0.0003	0.9424	-0.43097	0.106004	-0.42067	0.984104
315	2	6	0.1	6	0.1	150	45	4	1	1	0	2	1.723	1	0	1	-0.51954	0.785743	-0.43401	1.125301
316	-2	14	0.1	6	0.01	150	5	14	9	1	0	2	100.2439	0.8537	0.0045	0.5668	2.016045	0.390175	-0.23392	0.063386
317	-2	14	0.01	1	0.1	50	45	14	9	1	0	2	1.3849	1	0	1	-0.52824	0.785743	-0.43401	1.125301
318	-2	14	0.01	6	0.01	50	5	4	9	1	0	2	4.2783	0.8105	0.0023	0.6018	-0.45378	0.27337	-0.33174	0.149182
319	2	14	0.1	6	0.1	50	45	4	1	1	0	2	1.4815	1	0	1	-0.52576	0.785743	-0.43401	1.125301
320	-2	6	0.01	6	0.1	50	45	14	1	1	0	2	26.4651	0.8742	0.0112	0.4204	0.117234	0.445603	0.063977	-0.29549
321	-2	6	0.1	1	0.1	50	45	4	1	1	0	2	5.5558	0	0	0	-0.4209	-1.91807	-0.43401	-1.32603
322	2	14	0.1	6	0.01	50	5	14	1	1	0	2	25.1201	0	0	0	0.082619	-1.91807	-0.43401	-1.32603
323	-2	6	0.01	1	0.01	50	5	4	1	1	0	2	24.172	0	0	0	0.058218	-1.91807	-0.43401	-1.32603
324	-2	6	0.1	6	0.1	50	5	4	9	1	0	2	99.8286	0.8537	0.0011	0.8434	2.005357	0.390175	-0.3851	0.741423
325	2	14	0.1	1	0.01	150	45	14	1	1	0	2	2.3906	1	0.0049	0	-0.50236	0.785743	-0.21614	-1.32603
326	2	14	0.01	1	0.1	50	5	14	1	1	0	2	3.3019	0	0	0	-0.47891	-1.91807	-0.43401	-1.32603
327	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	2	2.6561	0.8289	0.0204	0.3189	-0.49553	0.32312	0.473036	-0.5443
328	2	10	0.055	3.5	0.055	100	25	9	5	1	0	2	5.8809	0	0	0	-0.41253	-1.91807	-0.43401	-1.32603
329	0	6	0.055	3.5	0.055	100	25	9	5	1	0	2	1.7554	0.9121	0.0008	0.9663	-0.51871	0.548077	-0.39844	1.042691
330	0	14	0.055	3.5	0.055	100	25	9	5	1	0	2	1.9408	0.956	0.0833	0.1141	-0.51394	0.666775	3.269758	-1.04633
331	0	10	0.01	3.5	0.055	100	25	9	5	1	0	2	6.0519	0	0	0	-0.40813	-1.91807	-0.43401	-1.32603
332	0	10	0.1	3.5	0.055	100	25	9	5	1	0	2	6.0791	0.7892	0.0003	0.9481	-0.40743	0.215778	-0.42067	0.998077
333	0	10	0.055	1	0.055	100	25	9	5	1	0	2	4.2988	0	0.0004	0	-0.45325	-1.91807	-0.41622	-1.32603
334	0	10	0.055	6	0.055	100	25	9	5	1	0	2	5.0323	0	0	0	-0.43437	-1.91807	-0.43401	-1.32603
335	0	10	0.055	3.5	0.01	100	25	9	5	1	0	2	1.5463	0.9617	0.0843	0.1141	-0.52409	0.682187	3.314221	-1.04633
336	0	10	0.055	3.5	0.1	100	25	9	5	1	0	2	4.6678	0.8825	0.0018	0.9483	-0.44375	0.468044	-0.35397	0.998567
337	0	10	0.055	3.5	0.055	50	25	9	5	1	0	2	1.5835	1	0	1	-0.52313	0.785743	-0.43401	1.125301
338	0	10	0.055	3.5	0.055	150	25	9	5	1	0	2	9.0039	0	0	0	-0.33216	-1.91807	-0.43401	-1.32603
339	0	10	0.055	3.5	0.055	100	5	9	5	1	0	2	3.2605	1	0	1	-0.47997	0.785743	-0.43401	1.125301
340	0	10	0.055	3.5	0.055	100	45	9	5	1	0	2	1.6644	1	0	1	-0.52105	0.785743	-0.43401	1.125301
341	0	10	0.055	3.5	0.055	100	25	4	5	1	0	2	100.2243	0.8673	0.0008	0.8809	2.015541	0.426946	-0.39844	0.833348
342	0	10	0.055	3.5	0.055	100	25	14	5	1	0	2	3.1422	1	0.0047	0	-0.48302	0.785743	-0.22503	-1.32603
343	0	10	0.055	3.5	0.055	100	25	9	1	1	0	2	1.3617	1	0.0013	0	-0.52884	0.785743	-0.37621	-1.32603
344	0	10	0.055	3.5	0.055	100	25	9	9	1	0	2	3.4701	0.8509	0.0036	0.5547	-0.47458	0.382604	-0.27394	0.033725
345	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	3.7963	0.6218	0.0031	0.4512	-0.46618	-0.23684	-0.29617	-0.21999

346	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	2.2773	1	0	1	-0.50528	0.785743	-0.43401	1.125301
347	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	4.3725	0.8825	0.0007	0.9795	-0.45135	0.468044	-0.40288	1.075048
348	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	1.6921	0.8264	0.0058	0.5561	-0.52034	0.31636	-0.17612	0.037157
349	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	2.3236	1	0.004	0	-0.50408	0.785743	-0.25616	-1.32603
350	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	2.3362	1	0.0059	0	-0.50376	0.785743	-0.17168	-1.32603
351	2	6	0.01	6	0.1	50	5	4	1	0	0	2	1.3567	1	0	1	-0.52897	0.785743	-0.43401	1.125301
352	2	6	0.1	1	0.1	50	45	14	9	0	0	2	3.5943	0.6873	0.0004	0.9791	-0.47138	-0.05974	-0.41622	1.074068
353	2	14	0.01	6	0.1	50	5	14	9	0	0	2	27.414	0.845	0.0304	0.3079	0.141656	0.366651	0.917666	-0.57126
354	2	14	0.1	1	0.1	150	45	4	9	0	0	2	2.5214	1	0.0589	0	-0.49899	0.785743	2.184861	-1.32603
355	2	14	0.01	1	0.1	50	5	4	9	0	0	2	9.0432	0	0	0	-0.33114	-1.91807	-0.43401	-1.32603
356	-2	6	0.01	1	0.1	150	5	14	9	0	0	2	25.3765	1	0	1	0.089218	0.785743	-0.43401	1.125301
357	2	6	0.1	6	0.1	150	5	14	9	0	0	2	2.0156	1	0	1	-0.51201	0.785743	-0.43401	1.125301
358	2	14	0.1	6	0.1	150	5	4	1	0	0	2	4.0364	0.9428	0.0017	0.9539	-0.46	0.631085	-0.35842	1.012294
359	2	6	0.01	6	0.01	50	45	4	9	0	0	2	31.2901	0	0	0	0.241413	-1.91807	-0.43401	-1.32603
360	2	6	0.01	6	0.01	150	5	14	1	0	0	2	2.7875	0.8825	0.0018	0.9483	-0.49214	0.468044	-0.35397	0.998567
361	-2	14	0.01	1	0.1	150	5	4	1	0	0	2	1.813	0.9577	0.0014	0.946	-0.51723	0.671371	-0.37176	0.992929
362	-2	6	0.1	1	0.01	50	5	14	1	0	0	2	3.2704	0.5371	0.0005	0.9777	-0.47972	-0.46585	-0.41178	1.070636
363	-2	14	0.1	1	0.1	50	5	14	9	0	0	2	3.434	0.8144	0.0129	0.2566	-0.47551	0.283915	0.139564	-0.69702
364	2	14	0.1	6	0.01	150	45	4	9	0	0	2	19.3106	0	0	0	-0.0669	-1.91807	-0.43401	-1.32603
365	-2	6	0.01	6	0.01	150	45	14	9	0	0	2	2.4687	1	0	1	-0.50035	0.785743	-0.43401	1.125301
366	2	14	0.01	1	0.01	150	45	4	1	0	0	2	3.3711	1	0.0068	0	-0.47713	0.785743	-0.13166	-1.32603
367	-2	14	0.01	6	0.01	150	45	14	1	0	0	2	2.8847	0.9113	0.0014	0.9426	-0.48964	0.545914	-0.37176	0.984594
368	2	14	0.01	6	0.1	150	45	14	1	0	0	2	1.6738	1	0	1	-0.52081	0.785743	-0.43401	1.125301
369	2	6	0.1	1	0.01	50	5	4	1	0	0	2	4.0166	0.6218	0.002	0.5585	-0.46051	-0.23684	-0.34508	0.04304
370	-2	6	0.1	1	0.01	150	45	4	9	0	0	2	3.4387	0.6218	0.0019	0.5759	-0.47539	-0.23684	-0.34953	0.085693
371	-2	6	0.1	1	0.1	150	5	4	1	0	0	2	3.9499	1	0.0062	0	-0.46223	0.785743	-0.15834	-1.32603
372	2	6	0.01	6	0.01	150	5	4	9	0	0	2	8.8833	0	0	0	-0.33526	-1.91807	-0.43401	-1.32603
373	2	14	0.01	1	0.01	150	5	14	9	0	0	2	2.3431	1	0	1	-0.50358	0.785743	-0.43401	1.125301
374	-2	6	0.01	1	0.1	150	45	14	1	0	0	2	76.1336	0.7184	0.0467	0.1101	1.39553	0.024348	1.642413	-1.05614
375	-2	14	0.01	1	0.01	150	45	4	9	0	0	2	1.3972	1	0	1	-0.52793	0.785743	-0.43401	1.125301
376	-2	6	0.01	6	0.1	150	45	4	9	0	0	2	10.7631	1	0	1	-0.28688	0.785743	-0.43401	1.125301
377	2	6	0.01	1	0.01	50	5	14	9	0	0	2	6.0525	0.8701	0.0001	0.9963	-0.40812	0.434517	-0.42956	1.116231
378	-2	6	0.1	6	0.1	150	45	14	9	0	0	2	4.2788	0.8437	0.0001	0.9963	-0.45376	0.363136	-0.42956	1.116231
379	-2	14	0.1	1	0.01	50	5	4	1	0	0	2	2.1449	0.9959	0.0483	0.4093	-0.50868	0.774657	1.713553	-0.3227
380	-2	6	0.1	6	0.01	150	45	4	1	0	0	2	1.8703	0.8623	0.0005	0.9765	-0.51575	0.413427	-0.41178	1.067694
381	2	14	0.1	1	0.01	50	45	4	9	0	0	2	115.274	0.9519	0.0006	0.9296	2.402868	0.655689	-0.40733	0.952727
382	-2	14	0.1	6	0.01	50	45	14	9	0	0	2	2.2838	0.7971	0.0052	0.567	-0.50511	0.237139	-0.2028	0.063876
383	-2	14	0.1	6	0.1	50	5	14	1	0	0	2	26.4622	0.8742	0.007	0.5366	0.11716	0.445603	-0.12277	-0.01064
384	2	6	0.01	1	0.01	50	45	14	1	0	0	2	8.5523	0	0	0	-0.34378	-1.91807	-0.43401	-1.32603
385	2	6	0.1	6	0.1	150	45	4	1	0	0	2	4.4412	1	0.0038	0	-0.44958	0.785743	-0.26505	-1.32603
386	-2	14	0.1	6	0.01	150	5	14	9	0	0	2	2.3219	1	0	1	-0.50413	0.785743	-0.43401	1.125301
387	-2	14	0.01	1	0.1	50	45	14	9	0	0	2	2.6178	0.9859	0.0323	0.5004	-0.49651	0.747619	1.002146	-0.09938
388	-2	14	0.01	6	0.01	50	5	4	9	0	0	2	4.3024	0	0.0016	0	-0.45316	-1.91807	-0.36287	-1.32603
389	2	14	0.1	6	0.1	50	45	4	1	0	0	2	5.4408	0	0.0007	0	-0.42386	-1.91807	-0.40288	-1.32603
390	-2	6	0.01	6	0.1	50	45	14	1	0	0	2	5.5916	0.3362	0.0019	0.4202	-0.41998	-1.00905	-0.34953	-0.29598
391	-2	6	0.1	1	0.1	50	45	4	1	0	0	2	1.2422	1	0	1	-0.53192	0.785743	-0.43401	1.125301
392	2	14	0.1	6	0.01	50	5	14	1	0	0	2	2.4385	0.4195	0	0.9977	-0.50113	-0.78382	-0.43401	1.119663
393	-2	6	0.01	1	0.01	50	5	4	1	0	0	2	2.3454	0.7643	0.005	0.597	-0.50352	0.148453	-0.21169	0.137416
394	-2	6	0.1	6	0.1	50	5	4	9	0	0	2	2.0484	1	0	1	-0.51117	0.785743	-0.43401	1.125301
395	2	14	0.1	1	0.01	150	45	14	1	0	0	2	2.1235	1	0	1	-0.50923	0.785743	-0.43401	1.125301
396	2	14	0.01	1	0.1	50	5	14	1	0	0	2	2.3574	1	0.0045	0	-0.50321	0.785743	-0.23392	-1.32603
397	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	2	9.5027	0	0	0	-0.31932	-1.91807	-0.43401	-1.32603
398	2	10	0.055	3.5	0.055	100	25	9	5	0	0	2	2.4601	0.8972	0.0006	0.9736	-0.50057	0.507791	-0.40733	1.060586
399	0	6	0.055	3.5	0.055	100	25	9	5	0	0	2	72.6393	0.7045	0.0591	0.0881	1.305598	-0.01323	2.193754	-1.11006
400	0	14	0.055	3.5	0.055	100	25	9	5	0	0	2	165.7737	0	0	0	3.702555	-1.91807	-0.43401	-1.32603
401	0	10	0.01	3.5	0.055	100	25	9	5	0	0	2	5.9736	0.9428	0.0022	0.9428	-0.41015	0.631085	-0.33619	0.985085
402	0	10	0.1	3.5	0.055	100	25	9	5	0	0	2	3.0731	0.8095	0.0105	0.2976	-0.48479	0.270666	0.032853	-0.59651
403	0	10	0.055	1	0.055	100	25	9	5	0	0	2	1.7722	1	0	1	-0.51828	0.785743	-0.43401	1.125301
404	0	10	0.055	6	0.055	100	25	9	5	0	0	2	108.4037	0	0	0	2.22605	-1.91807	-0.43401	-1.32603
405	0	10	0.055	3.5	0.01	100	25	9	5	0	0	2	4.3459	0.4714	0.0014	0.9229	-0.45204	-0.64349	-0.37176	0.936303
406	0	10	0.055	3.5	0.1	100	25	9	5	0	0	2	5.2562	0.9051	0.0017	0.9524	-0.42861	0.529151	-0.35842	1.008617
407	0	10	0.055	3.5	0.055	50	25	9	5	0	0	2	3.6557	0.0511	0.0131	0.0156	-0.4698	-1.77991	0.148457	-1.28779
408	0	10	0.055	3.5	0.055	150	25	9	5	0	0	2	1.6713	1	0	1	-0.52087	0.785743	-0.43401	1.125301
409	0	10	0.055	3.5	0.055	100	5	9	5	0	0	2	2.3899	0.9564	0.0082	0.817	-0.50238	0.667856	-0.06941	0.676708
410	0	10	0.055	3.5	0.055	100	45	9	5	0	0	2	2.2184	1	0.0231	0	-0.50679	0.785743	0.593086	-1.32603
411	0	10	0.055	3.5	0.055	100	25	4	5	0	0	2	4.0021	0.2468	0.0015	0.4085	-0.46089	-1.25077	-0.36731	-0.32466
412	0	10	0.055	3.5	0.055	100	25	14	5	0	0	2	2.8331	1	0.004	0	-0.49097	0.785743	-0.25616	-1.32603
413	0	10	0.055	3.5	0.055	100	25	9	1	0	0	2	1.6156	1	0	1	-0.52231	0.785743	-0.43401	1.125301
414	0	10	0.055	3.5	0.055	100	25	9	9	0	0	2	3.3019	1	0.0059	0	-0.47891	0.785743	-0.17168	-1.32603
415	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	3.8474	0.9847	0.0429	0.4923	-0.46487	0.744374	1.473453	-0.11924
416	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	3.7187	0.8471	0.0001	0.9964	-0.46818	0.372329	-0.42956	1.116476
417	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	3.6307	0.8167	0.0163	0.1787	-0.47044	0.290133	0.290738	-0.88797
418	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	1.6499	1	0	1	-0.52142	0.785743	-0.43401	1.125301

419	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	9.0385	0	0	0	-0.33127	-1.91807	-0.43401	-1.32603
420	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	18.8157	0	0	0	-0.07963	-1.91807	-0.43401	-1.32603
421	2	6	0.01	6	0.1	50	5	4	1	1	1	2	2.7748	0.4518	0	0.9979	-0.49247	-0.69649	-0.43401	1.120153
422	2	6	0.1	1	0.1	50	45	14	9	1	1	2	1.8573	1	0.0544	0	-0.51609	0.785743	1.984778	-1.32603
423	2	14	0.01	6	0.1	50	5	14	9	1	1	2	6.8894	0	0	0	-0.38658	-1.91807	-0.43401	-1.32603
424	2	14	0.1	1	0.1	150	45	4	9	1	1	2	3.1326	1	0.0491	0	-0.48326	0.785743	1.749124	-1.32603
425	2	14	0.01	1	0.1	50	5	4	9	1	1	2	3.002	0.9663	0.0053	0.8741	-0.48662	0.694624	-0.19835	0.816679
426	-2	6	0.01	1	0.1	150	5	14	9	1	1	2	2.2977	0.9564	0.0082	0.817	-0.50475	0.667856	-0.06941	0.676708
427	2	6	0.1	6	0.1	150	5	14	9	1	1	2	2.3657	1	0	1	-0.503	0.785743	-0.43401	1.125301
428	2	14	0.1	6	0.1	150	5	4	1	1	1	2	1.1948	1	0	1	-0.53314	0.785743	-0.43401	1.125301
429	2	6	0.01	6	0.01	50	45	4	9	1	1	2	4.0108	1	0.003	0	-0.46066	0.785743	-0.30062	-1.32603
430	2	6	0.01	6	0.01	150	5	14	1	1	1	2	4.5612	1	0.0047	0	-0.4465	0.785743	-0.22503	-1.32603
431	-2	14	0.01	1	0.1	150	5	4	1	1	1	2	4.64	0.6218	0.0033	0.4405	-0.44447	-0.23684	-0.28728	-0.24622
432	-2	6	0.1	1	0.01	50	5	14	1	1	1	2	4.9016	0.9858	0.005	0.8953	-0.43774	0.747349	-0.21169	0.868647
433	-2	14	0.1	1	0.1	50	5	14	9	1	1	2	1.4651	1	0	1	-0.52618	0.785743	-0.43401	1.125301
434	2	14	0.1	6	0.01	150	45	4	9	1	1	2	9.427	0	0	0	-0.32127	-1.91807	-0.43401	-1.32603
435	-2	6	0.01	6	0.01	150	45	14	9	1	1	2	1.5552	1	0	1	-0.52386	0.785743	-0.43401	1.125301
436	2	14	0.01	1	0.01	150	45	4	1	1	1	2	9.506	0	0	0	-0.31923	-1.91807	-0.43401	-1.32603
437	-2	14	0.01	6	0.01	150	45	14	1	1	1	2	2.6416	1	0	1	-0.4959	0.785743	-0.43401	1.125301
438	2	14	0.01	6	0.1	150	45	14	1	1	1	2	2.2205	1	0	1	-0.50674	0.785743	-0.43401	1.125301
439	2	6	0.1	1	0.01	50	5	4	1	1	1	2	25.7135	1	0	1	0.097891	0.785743	-0.43401	1.125301
440	-2	6	0.1	1	0.01	150	45	4	9	1	1	2	3.1661	0	0	0	-0.4824	-1.91807	-0.43401	-1.32603
441	-2	6	0.1	1	0.1	150	5	4	1	1	1	2	2.9244	1	0.0049	0	-0.48862	0.785743	-0.21614	-1.32603
442	2	6	0.01	6	0.01	150	5	4	9	1	1	2	64.7807	0.8981	0.1053	0.069	1.103345	0.510224	4.247943	-1.15688
443	2	14	0.01	1	0.01	150	5	14	9	1	1	2	2.4595	0.8587	0.0009	0.9605	-0.50059	0.403694	-0.39399	1.028473
444	-2	6	0.01	1	0.1	150	45	14	1	1	1	2	15.7307	0.9434	0.0017	0.8316	-0.15903	0.632707	-0.35842	0.712497
445	-2	14	0.01	1	0.01	150	45	4	9	1	1	2	2.1576	1	0.0136	0	-0.50836	0.785743	0.170688	-1.32603
446	-2	6	0.01	6	0.1	150	45	4	9	1	1	2	114.7727	0.9664	0.0726	0.1382	2.389966	0.694895	2.794004	-0.98725
447	2	6	0.01	1	0.01	50	5	14	9	1	1	2	5.074	0	0.0002	0	-0.4333	-1.91807	-0.42512	-1.32603
448	-2	6	0.1	6	0.1	150	45	14	9	1	1	2	3.1824	1	0	1	-0.48198	0.785743	-0.43401	1.125301
449	-2	14	0.1	1	0.01	50	5	4	1	1	1	2	1.7445	1	0	1	-0.51899	0.785743	-0.43401	1.125301
450	-2	6	0.1	6	0.01	150	45	4	1	1	1	2	1.2959	1	0	1	-0.53053	0.785743	-0.43401	1.125301
451	2	14	0.1	1	0.01	50	45	4	9	1	1	2	4.4896	0.8825	0.0018	0.9483	-0.44834	0.468044	-0.35397	0.998567
452	-2	14	0.1	6	0.01	50	45	14	9	1	1	2	2.1068	1	0.0066	0	-0.50966	0.785743	-0.14055	-1.32603
453	-2	14	0.1	6	0.1	50	5	14	1	1	1	2	2.4281	1	0	1	-0.50139	0.785743	-0.43401	1.125301
454	2	6	0.01	1	0.01	50	45	14	1	1	1	2	10.4476	0	0	0	-0.295	-1.91807	-0.43401	-1.32603
455	2	6	0.1	6	0.1	150	45	4	1	1	1	2	4.8089	0	0.0002	0	-0.44012	-1.91807	-0.42512	-1.32603
456	-2	14	0.1	6	0.01	150	5	14	9	1	1	2	96.3686	0.9621	0.0553	0.12	1.916308	0.683268	2.024794	-1.03187
457	-2	14	0.01	1	0.1	50	45	14	9	1	1	2	6.3236	0.3362	0.0028	0.3278	-0.40114	-1.00905	-0.30951	-0.52248
458	-2	14	0.01	6	0.01	50	5	4	9	1	1	2	3.8932	0.8509	0.0041	0.5249	-0.46369	0.382604	-0.25171	-0.03932
459	2	14	0.1	6	0.1	50	45	4	1	1	1	2	3.9563	0	0	0	-0.46206	-1.91807	-0.43401	-1.32603
460	-2	6	0.01	6	0.1	50	45	14	1	1	1	2	2.3381	1	0	1	-0.50371	0.785743	-0.43401	1.125301
461	-2	6	0.1	1	0.1	50	45	4	1	1	1	2	1.6888	1	0	1	-0.52042	0.785743	-0.43401	1.125301
462	2	14	0.1	6	0.01	50	5	14	1	1	1	2	7.6182	0.4142	0.0008	0.9474	-0.36782	-0.79815	-0.39844	0.996361
463	-2	6	0.01	1	0.01	50	5	4	1	1	1	2	2.448	0.9987	0.0496	0.4163	-0.50088	0.782228	1.771355	-0.30554
464	-2	6	0.1	6	0.1	50	5	4	9	1	1	2	2.1794	1	0	1	-0.5078	0.785743	-0.43401	1.125301
465	2	14	0.1	1	0.01	150	45	14	1	1	1	2	1.8229	0.9818	0.0179	0.6255	-0.51697	0.736533	0.361879	0.207279
466	2	14	0.01	1	0.1	50	5	14	1	1	1	2	8.718	0.9612	0.0082	0.4728	-0.33951	0.680835	-0.06941	-0.16704
467	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	2	60.9756	0.8118	0.0017	0.7302	1.005415	0.276885	-0.35842	0.463933
468	2	10	0.055	3.5	0.055	100	25	9	5	1	1	2	2.0983	0.9538	0.0544	0.1574	-0.50988	0.660827	1.984778	-0.94019
469	0	6	0.055	3.5	0.055	100	25	9	5	1	1	2	4.8832	0.8352	0.0227	0.1429	-0.43821	0.340154	0.575301	-0.97573
470	0	14	0.055	3.5	0.055	100	25	9	5	1	1	2	3.8031	0	0.0165	0	-0.46601	-1.91807	0.299631	-1.32603
471	0	10	0.01	3.5	0.055	100	25	9	5	1	1	2	2.6903	0.9088	0.0006	0.9721	-0.49465	0.539155	-0.40733	1.056909
472	0	10	0.1	3.5	0.055	100	25	9	5	1	1	2	2.6117	0.8683	0.0238	0.1663	-0.49667	0.42965	0.624211	-0.91837
473	0	10	0.055	1	0.055	100	25	9	5	1	1	2	112.5802	0.7806	0.0006	0.9134	2.333539	0.192526	-0.40733	0.913016
474	0	10	0.055	6	0.055	100	25	9	5	1	1	2	7.6932	0	0.0008	0	-0.36589	-1.91807	-0.39844	-1.32603
475	0	10	0.055	3.5	0.01	100	25	9	5	1	1	2	4.0434	1	0.0075	0	-0.45982	0.785743	-0.10054	-1.32603
476	0	10	0.055	3.5	0.1	100	25	9	5	1	1	2	3.7583	0	0.0019	0	-0.46716	-1.91807	-0.34953	-1.32603
477	0	10	0.055	3.5	0.055	50	25	9	5	1	1	2	3.5601	0.6505	0.0177	0.2966	-0.47226	-0.15924	0.352986	-0.59896
478	0	10	0.055	3.5	0.055	150	25	9	5	1	1	2	3.0686	0.8224	0.0029	0.6642	-0.48491	0.305545	-0.30507	0.302145
479	0	10	0.055	3.5	0.055	100	5	9	5	1	1	2	3.9402	0	0.0019	0	-0.46248	-1.91807	-0.34953	-1.32603
480	0	10	0.055	3.5	0.055	100	45	9	5	1	1	2	5.9333	0	0	0	-0.41118	-1.91807	-0.43401	-1.32603
481	0	10	0.055	3.5	0.055	100	25	4	5	1	1	2	2.9434	0.6959	0.0013	0.7153	-0.48813	-0.03649	-0.37621	0.427408
482	0	10	0.055	3.5	0.055	100	25	14	5	1	1	2	2.7776	1	0	1	-0.4924	0.785743	-0.43401	1.125301
483	0	10	0.055	3.5	0.055	100	25	9	1	1	1	2	99.3914	0.8869	0.0014	0.8123	1.994105	0.479941	-0.37176	0.665187
484	0	10	0.055	3.5	0.055	100	25	9	9	1	1	2	75.8783	0.9153	0.1344	0.0404	1.388959	0.55673	5.541816	-1.22699
485	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	4.0714	0	0	0	-0.4591	-1.91807	-0.43401	-1.32603
486	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	2.8914	1	0	1	-0.48947	0.785743	-0.43401	1.125301
487	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	5.3446	0.8283	0.0166	0.7132	-0.42633	0.321498	0.304077	0.42226
488	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	5.8588	0.7892	0.0003	0.9359	-0.4131	0.215778	-0.42067	0.968171
489	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	19.6568	0	0	0	-0.05799	-1.91807	-0.43401	-1.32603
490	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	165.9218	0	0	0	3.706367	-1.91807	-0.43401	-1.32603
491	2	6	0.01	6	0.1	50	5	4	1	0	1	2	98.7528	0.9683	0.0359	0.178	1.977669	0.700032	1.162213	-0.88969

492	2	6	0.1	1	0.1	50	45	14	9	0	1	2	81.7533	0.5852	0.0002	0.945	1.540161	-0.3358	-0.42512	0.990478
493	2	14	0.01	6	0.1	50	5	14	9	0	1	2	1.6493	1	0	1	-0.52144	0.785743	-0.43401	1.125301
494	2	14	0.1	1	0.1	150	45	4	9	0	1	2	4.6908	0.7757	0.0114	0.7513	-0.44316	0.179277	0.07287	0.515656
495	2	14	0.01	1	0.1	50	5	4	9	0	1	2	2.6544	0.9679	0.0271	0.6325	-0.49557	0.69895	0.770938	0.224438
496	-2	6	0.01	1	0.1	150	5	14	9	0	1	2	3.3716	0.8825	0.0018	0.9483	-0.47711	0.468044	-0.35397	0.998567
497	2	6	0.1	6	0.1	150	5	14	9	0	1	2	82.5733	0	0	0	1.561265	-1.91807	-0.43401	-1.32603
498	2	14	0.1	6	0.1	150	5	4	1	0	1	2	1.9142	0.8264	0.0057	0.5613	-0.51462	0.31636	-0.18057	0.049903
499	2	6	0.01	6	0.01	50	45	4	9	0	1	2	3.0855	0.6283	0.0178	0.2941	-0.48448	-0.21927	0.357433	-0.60509
500	2	6	0.01	6	0.01	150	5	14	1	0	1	2	3.1467	0.7515	0.0079	0.498	-0.4829	0.113845	-0.08275	-0.10527
501	-2	14	0.01	1	0.1	150	5	4	1	0	1	2	5.2372	0.8368	0.002	0.7227	-0.4291	0.34448	-0.34508	0.445548
502	-2	6	0.1	1	0.01	50	5	14	1	0	1	2	4.6337	0.8368	0.0022	0.7004	-0.44463	0.34448	-0.33619	0.390883
503	-2	14	0.1	1	0.1	50	5	14	9	0	1	2	3.8548	0.4293	0.0001	0.9933	-0.46468	-0.75732	-0.42956	1.108877
504	2	14	0.1	6	0.01	150	45	4	9	0	1	2	4.3556	0.8385	0.0018	0.7068	-0.45179	0.349077	-0.35397	0.406572
505	-2	6	0.01	6	0.01	150	45	14	9	0	1	2	18.0338	0	0	0	-0.09976	-1.91807	-0.43401	-1.32603
506	2	14	0.01	1	0.01	150	45	4	1	0	1	2	100.3889	0.8673	0.0045	0.5688	2.019777	0.426946	-0.23392	0.068288
507	-2	14	0.01	6	0.01	150	45	14	1	0	1	2	122.68	0.9645	0.0047	0.6312	2.593473	0.689757	-0.22503	0.221251
508	2	14	0.01	6	0.1	150	45	14	1	0	1	2	1.8858	0.782	0.0037	0.6341	-0.51535	0.196311	-0.2695	0.22836
509	2	6	0.1	1	0.01	50	5	4	1	0	1	2	1.4436	1	0	1	-0.52673	0.785743	-0.43401	1.125301
510	-2	6	0.1	1	0.01	150	45	4	9	0	1	2	1.9557	1	0.0096	0	-0.51355	0.785743	-0.00716	-1.32603
511	-2	6	0.1	1	0.1	150	5	4	1	0	1	2	1.9845	0.9631	0.0017	0.9368	-0.51281	0.685972	-0.35842	0.970377
512	2	6	0.01	6	0.01	150	5	4	9	0	1	2	2.3811	1	0	1	-0.5026	0.785743	-0.43401	1.125301
513	2	14	0.01	1	0.01	150	5	14	9	0	1	2	6.3695	1	0	1	-0.39996	0.785743	-0.43401	1.125301
514	-2	6	0.01	1	0.1	150	45	14	1	0	1	2	3.4244	0.9846	0.0329	0.5567	-0.47575	0.744104	1.028824	0.038627
515	-2	14	0.01	1	0.01	150	45	4	9	0	1	2	3.7745	0.492	0	1	-0.46674	-0.5878	-0.43401	1.125301
516	-2	6	0.01	6	0.1	150	45	4	9	0	1	2	1.2064	1	0	1	-0.53284	0.785743	-0.43401	1.125301
517	2	6	0.01	1	0.01	50	5	14	9	0	1	2	3.5623	0.9664	0.0075	0.8313	-0.4722	0.694895	-0.10054	0.711762
518	-2	6	0.1	6	0.1	150	45	14	9	0	1	2	6.5516	0	0	0	-0.39527	-1.91807	-0.43401	-1.32603
519	-2	14	0.1	1	0.01	50	5	4	1	0	1	2	6.5363	0.4199	0.0011	0.9346	-0.39566	-0.78274	-0.3851	0.964984
520	-2	6	0.1	6	0.01	150	45	4	1	0	1	2	1.8636	1	0	1	-0.51592	0.785743	-0.43401	1.125301
521	2	14	0.1	1	0.01	50	45	4	9	0	1	2	3.2128	0.8209	0	1	-0.4812	0.301489	-0.43401	1.125301
522	-2	14	0.1	6	0.01	50	45	14	9	0	1	2	1.9787	1	0	1	-0.51296	0.785743	-0.43401	1.125301
523	-2	14	0.1	6	0.1	50	5	14	1	0	1	2	2.616	1	0	1	-0.49656	0.785743	-0.43401	1.125301
524	2	6	0.01	1	0.01	50	45	14	1	0	1	2	18.1198	0	0	0	-0.09754	-1.91807	-0.43401	-1.32603
525	2	6	0.1	6	0.1	150	45	4	1	0	1	2	19.7422	0	0	0	-0.05579	-1.91807	-0.43401	-1.32603
526	-2	14	0.1	6	0.01	150	5	14	9	0	1	2	2.8053	0.8807	0.0017	0.9501	-0.49169	0.463178	-0.35842	1.002979
527	-2	14	0.01	1	0.1	50	45	14	9	0	1	2	2.1715	0.9579	0.1171	0.0875	-0.508	0.671912	4.772606	-1.11154
528	-2	14	0.01	6	0.01	50	5	4	9	0	1	2	6.1361	0.9428	0.0017	0.9539	-0.40596	0.631085	-0.35842	1.012294
529	2	14	0.1	6	0.1	50	45	4	1	0	1	2	65.6849	0.8052	0.0047	0.4644	1.126616	0.25904	-0.22503	-0.18763
530	-2	6	0.01	6	0.1	50	45	14	1	0	1	2	2.3502	1	0	1	-0.5034	0.785743	-0.43401	1.125301
531	-2	6	0.1	1	0.1	50	45	4	1	0	1	2	5.7973	0.78	0.0113	0.7573	-0.41468	0.190903	0.068423	0.530364
532	2	14	0.1	6	0.01	50	5	14	1	0	1	2	2.1244	0.9838	0.0204	0.6009	-0.50921	0.741941	0.473036	0.146976
533	-2	6	0.01	1	0.01	50	5	4	1	0	1	2	3.0168	1	0.0045	0	-0.48624	0.785743	-0.23392	-1.32603
534	-2	6	0.1	6	0.1	50	5	4	9	0	1	2	6.0063	0.8826	0.0018	0.9474	-0.4093	0.468315	-0.35397	0.996361
535	2	14	0.1	1	0.01	150	45	14	1	0	1	2	3.672	0.8826	0.0018	0.9474	-0.46938	0.468315	-0.35397	0.996361
536	2	14	0.01	1	0.1	50	5	14	1	0	1	2	2.0228	0.9538	0.0544	0.1574	-0.51183	0.660827	1.984778	-0.94019
537	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	2	5.3833	0.017	0.015	0.0046	-0.42534	-1.87211	0.232936	-1.31475
538	2	10	0.055	3.5	0.055	100	25	9	5	0	1	2	6.4706	0	0.001	0	-0.39735	-1.91807	-0.38955	-1.32603
539	0	6	0.055	3.5	0.055	100	25	9	5	0	1	2	3.0205	0.9168	0.0009	0.9631	-0.48615	0.560785	-0.39399	1.034847
540	0	14	0.055	3.5	0.055	100	25	9	5	0	1	2	4.2325	1	0	1	-0.45496	0.785743	-0.43401	1.125301
541	0	10	0.01	3.5	0.055	100	25	9	5	0	1	2	3.6515	0.8825	0.0018	0.9483	-0.46991	0.468044	-0.35397	0.998567
542	0	10	0.1	3.5	0.055	100	25	9	5	0	1	2	3.8947	0.492	0.0018	0.9099	-0.46365	-0.5878	-0.35397	0.904436
543	0	10	0.055	1	0.055	100	25	9	5	0	1	2	25.7089	1	0	1	0.097772	0.785743	-0.43401	1.125301
544	0	10	0.055	6	0.055	100	25	9	5	0	1	2	2.6229	0.947	0.0018	0.9322	-0.49638	0.642441	-0.35397	0.959101
545	0	10	0.055	3.5	0.01	100	25	9	5	0	1	2	26.1241	1	0	1	0.108458	0.785743	-0.43401	1.125301
546	0	10	0.055	3.5	0.1	100	25	9	5	0	1	2	7.1203	0.9428	0.0013	0.9652	-0.38063	0.631085	-0.37621	1.039994
547	0	10	0.055	3.5	0.055	50	25	9	5	0	1	2	5.5176	0.8385	0.0018	0.7068	-0.42188	0.349077	-0.35397	0.406572
548	0	10	0.055	3.5	0.055	150	25	9	5	0	1	2	2.2197	1	0.0541	0	-0.50676	0.785743	1.971439	-1.32603
549	0	10	0.055	3.5	0.055	100	5	9	5	0	1	2	2.9415	0.9176	0.0324	0.136	-0.48818	0.562948	1.006592	-0.99265
550	0	10	0.055	3.5	0.055	100	45	9	5	0	1	2	83.3298	0.6344	0.0006	0.8741	1.580735	-0.20277	-0.40733	0.816679
551	0	10	0.055	3.5	0.055	100	25	4	5	0	1	2	3.4072	0	0	0	-0.4762	-1.91807	-0.43401	-1.32603
552	0	10	0.055	3.5	0.055	100	25	14	5	0	1	2	113.8261	0.8976	0.005	0.5591	2.365604	0.508872	-0.21169	0.044511
553	0	10	0.055	3.5	0.055	100	25	9	1	0	1	2	168.7245	0	0	0	3.778499	-1.91807	-0.43401	-1.32603
554	0	10	0.055	3.5	0.055	100	25	9	9	0	1	2	2.7367	0.8281	0.0137	0.305	-0.49345	0.320957	0.175135	-0.57837
555	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	104.0536	0.9483	0.0024	0.77	2.114094	0.645956	-0.3273	0.561495
556	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	119.0906	0.9104	0.0025	0.7176	2.501094	0.543481	-0.32285	0.433046
557	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	94.1596	0.8649	0.0044	0.583	1.859456	0.420457	-0.23837	0.103097
558	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	3.0645	0.4302	0.001	0.9391	-0.48502	-0.75489	-0.38955	0.976015
559	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	2.5348	0.8806	0.0016	0.952	-0.49865	0.462907	-0.36287	1.007637
560	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	1.4013	1	0	1	-0.52782	0.785743	-0.43401	1.125301

Table A.2 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 2) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 3)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
561	2	6	0.01	6	0.1	50	5	4	1	1	0	3	77.4162	0.8408	0.0019	0.6984	1.428539	0.355295	-0.34953	0.38598
562	2	6	0.1	1	0.1	50	45	14	9	1	0	3	1.4742	1	0	1	-0.52594	0.785743	-0.43401	1.125301
563	2	14	0.01	6	0.1	50	5	14	9	1	0	3	5.7049	0.9428	0.0017	0.9539	-0.41706	0.631085	-0.35842	1.012294
564	2	14	0.1	1	0.1	150	45	4	9	1	0	3	27.4505	0.765	0.007	0.5534	0.142595	0.150346	-0.12277	0.030538
565	2	14	0.01	1	0.1	50	5	4	9	1	0	3	105.2287	0	0	0	2.144337	-1.91807	-0.43401	-1.32603
566	-2	6	0.01	1	0.1	150	5	14	9	1	0	3	7.1295	0	0.001	0	-0.3804	-1.91807	-0.38955	-1.32603
567	2	6	0.1	6	0.1	150	5	14	9	1	0	3	2.3958	0.7971	0.0121	0.3583	-0.50223	0.237139	0.103994	-0.44772
568	2	14	0.1	6	0.1	150	5	4	1	1	0	3	98.5794	0.8838	0.0014	0.8141	1.973207	0.471559	-0.37176	0.669599
569	2	6	0.01	6	0.01	50	45	4	9	1	0	3	97.9672	0.9675	0.0111	0.477	1.957451	0.697869	0.059531	-0.15674
570	2	6	0.01	6	0.01	150	5	14	1	1	0	3	8.3949	0	0	0	-0.34783	-1.91807	-0.43401	-1.32603
571	-2	14	0.01	1	0.1	150	5	4	1	1	0	3	169.4264	0	0	0	3.796563	-1.91807	-0.43401	-1.32603
572	-2	6	0.1	1	0.01	50	5	14	1	1	0	3	4.4235	0	0.0015	0	-0.45004	-1.91807	-0.36731	-1.32603
573	-2	14	0.1	1	0.1	50	5	14	9	1	0	3	2.2925	1	0	1	-0.50488	0.785743	-0.43401	1.125301
574	2	14	0.1	6	0.01	150	45	4	9	1	0	3	2.2911	1	0.0059	0	-0.50492	0.785743	-0.17168	-1.32603
575	-2	6	0.01	6	0.01	150	45	14	9	1	0	3	2.8793	1	0	1	-0.48978	0.785743	-0.43401	1.125301
576	2	14	0.01	1	0.01	150	45	4	1	1	0	3	3.2397	0	0	0	-0.48051	-1.91807	-0.43401	-1.32603
577	-2	14	0.01	6	0.01	150	45	14	1	1	0	3	4.2313	0.5993	0.0001	0.9941	-0.45499	-0.29768	-0.42956	1.110838
578	2	14	0.01	6	0.1	150	45	14	1	1	0	3	2.695	1	0	1	-0.49453	0.785743	-0.43401	1.125301
579	2	6	0.1	1	0.01	50	5	4	1	1	0	3	5.6902	0.017	0.0144	0.0048	-0.41744	-1.87211	0.206259	-1.31426
580	-2	6	0.1	1	0.01	150	45	4	9	1	0	3	3.7824	0.6667	0.0608	0.1166	-0.46654	-0.11544	2.269341	-1.0402
581	-2	6	0.1	1	0.1	150	5	4	1	1	0	3	4.1154	0	0.0018	0	-0.45797	-1.91807	-0.35397	-1.32603
582	2	6	0.01	6	0.01	150	5	4	9	1	0	3	122.4541	0.9541	0.0006	0.9327	2.587659	0.661638	-0.40733	0.960326
583	2	14	0.01	1	0.01	150	5	14	9	1	0	3	5.8947	0	0	0	-0.41218	-1.91807	-0.43401	-1.32603
584	-2	6	0.01	1	0.1	150	45	14	1	1	0	3	3.8842	0.5175	0.0038	0.5441	-0.46392	-0.51885	-0.26505	0.007741
585	-2	14	0.01	1	0.01	150	45	4	9	1	0	3	1.9123	0.9928	0.0242	0.5661	-0.51467	0.766275	0.641996	0.06167
586	-2	6	0.01	6	0.1	150	45	4	9	1	0	3	2.3652	0.9632	0.002	0.9274	-0.50301	0.686242	-0.34508	0.947334
587	2	6	0.01	1	0.01	50	5	14	9	1	0	3	1.5521	1	0	1	-0.52394	0.785743	-0.43401	1.125301
588	-2	6	0.1	6	0.1	150	45	14	9	1	0	3	69.8842	0.5906	0.0006	0.8417	1.234692	-0.3212	-0.40733	0.737256
589	-2	14	0.1	1	0.01	50	5	4	1	1	0	3	104.1027	0	0	0	2.115357	-1.91807	-0.43401	-1.32603
590	-2	6	0.1	6	0.01	150	45	4	1	1	0	3	99.982	0.9184	0.009	0.417	2.009305	0.565111	-0.03384	-0.30382
591	2	14	0.1	1	0.01	50	45	4	9	1	0	3	1.2651	1	0	1	-0.53133	0.785743	-0.43401	1.125301
592	-2	14	0.1	6	0.01	50	45	14	9	1	0	3	9.9644	0	0	0	-0.30744	-1.91807	-0.43401	-1.32603
593	-2	14	0.1	6	0.1	50	5	14	1	1	0	3	119.9208	0.9167	0.0163	0.2862	2.52246	0.560515	0.290738	-0.62446
594	2	6	0.01	1	0.01	50	45	14	1	1	0	3	33.6544	0	0	0	0.302262	-1.91807	-0.43401	-1.32603
595	2	6	0.1	6	0.1	150	45	4	1	1	0	3	2.3869	1	0.0059	0	-0.50246	0.785743	-0.17168	-1.32603
596	-2	14	0.1	6	0.01	150	5	14	9	1	0	3	4.1394	0	0.0018	0	-0.45735	-1.91807	-0.35397	-1.32603
597	-2	14	0.01	1	0.1	50	45	14	9	1	0	3	3.771	1	0	1	-0.46683	0.785743	-0.43401	1.125301
598	-2	14	0.01	6	0.01	50	5	4	9	1	0	3	2.0637	0.8264	0.0057	0.5613	-0.51077	0.31636	-0.18057	0.049903
599	2	14	0.1	6	0.1	50	45	4	1	1	0	3	4.1226	0.8521	0.0224	0.1447	-0.45778	0.385848	0.561962	-0.97132
600	-2	6	0.01	6	0.1	50	45	14	1	1	0	3	116.515	0.9697	0.0204	0.3895	2.434807	0.703817	0.473036	-0.37123
601	-2	6	0.1	1	0.1	50	45	4	1	1	0	3	3.4906	0.9326	0.0006	0.9854	-0.47405	0.603506	-0.40733	1.089511
602	2	14	0.1	6	0.01	50	5	14	1	1	0	3	6.4134	0	0.0024	0	-0.39883	-1.91807	-0.3273	-1.32603
603	-2	6	0.01	1	0.01	50	5	4	1	1	0	3	160.9852	0	0	0	3.579316	-1.91807	-0.43401	-1.32603
604	-2	6	0.1	6	0.1	50	5	4	9	1	0	3	27.7538	0.8774	0.0188	0.3077	0.150401	0.454255	0.401896	-0.57175
605	2	14	0.1	1	0.01	150	45	14	1	1	0	3	2.1248	0.9452	0.0014	0.9469	-0.5092	0.637574	-0.37176	0.995135
606	2	14	0.01	1	0.1	50	5	14	1	1	0	3	11.6765	0.9612	0.0035	0.6804	-0.26337	0.680835	-0.27839	0.341857
607	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	3	3.8909	0.8825	0.0018	0.9483	-0.46375	0.468044	-0.35397	0.998567
608	2	10	0.055	3.5	0.055	100	25	9	5	1	0	3	118.4215	0.9611	0.0058	0.6198	2.483874	0.680564	-0.17612	0.193306
609	0	6	0.055	3.5	0.055	100	25	9	5	1	0	3	2.6702	1	0.0055	0	-0.49516	0.785743	-0.18946	-1.32603
610	0	14	0.055	3.5	0.055	100	25	9	5	1	0	3	5.1728	0.017	0.0144	0.0048	-0.43076	-1.87211	0.206259	-1.31426
611	0	10	0.01	3.5	0.055	100	25	9	5	1	0	3	5.5052	0.8826	0.0018	0.9474	-0.4222	0.468315	-0.35397	0.996361
612	0	10	0.1	3.5	0.055	100	25	9	5	1	0	3	2.7053	1	0	1	-0.49426	0.785743	-0.43401	1.125301
613	0	10	0.055	1	0.055	100	25	9	5	1	0	3	115.0784	0.9701	0.039	0.1754	2.397834	0.704899	1.300048	-0.89606
614	0	10	0.055	6	0.055	100	25	9	5	1	0	3	3.6904	0.7688	0.0035	0.6833	-0.46891	0.160621	-0.27839	0.348965
615	0	10	0.055	3.5	0.01	100	25	9	5	1	0	3	3.2744	1	0	1	-0.47961	0.785743	-0.43401	1.125301
616	0	10	0.055	3.5	0.1	100	25	9	5	1	0	3	114.7225	0.9548	0.006	0.6107	2.388674	0.66353	-0.16723	0.170999
617	0	10	0.055	3.5	0.055	50	25	9	5	1	0	3	2.9222	0.7711	0.0015	0.8366	-0.48868	0.166839	-0.36731	0.724754
618	0	10	0.055	3.5	0.055	150	25	9	5	1	0	3	2.6493	1	0.0048	0	-0.4957	0.785743	-0.22059	-1.32603
619	0	10	0.055	3.5	0.055	100	5	9	5	1	0	3	6.8595	0.8385	0.0018	0.7068	-0.38735	0.349077	-0.35397	0.406572
620	0	10	0.055	3.5	0.055	100	45	9	5	1	0	3	27.6752	0.8758	0.013	0.3873	0.148378	0.449929	0.14401	-0.37663
621	0	10	0.055	3.5	0.055	100	25	4	5	1	0	3	123.7927	0.9194	0.0405	0.2526	2.62211	0.567815	1.366742	-0.70682
622	0	10	0.055	3.5	0.055	100	25	14	5	1	0	3	2.1513	0.8965	0.0007	0.97	-0.50852	0.505898	-0.40288	1.051761
623	0	10	0.055	3.5	0.055	100	25	9	1	1	0	3	3.0834	0.8189	0.0091	0.7677	-0.48453	0.296082	-0.0294	0.555857
624	0	10	0.055	3.5	0.055	100	25	9	9	1	0	3	164.4685	0	0	0	3.668964	-1.91807	-0.43401	-1.32603
625	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	3.0653	1	0.004	0	-0.485	0.785743	-0.25616	-1.32603

626	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	6.3404	0.9116	0.005	0.6005	-0.40071	0.546725	-0.21169	0.145995
627	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	1.49	0.8194	0.0042	0.631	-0.52554	0.297434	-0.24726	0.220761
628	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	2.606	0.4195	0.0011	0.9295	-0.49682	-0.78382	-0.3851	0.952482
629	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	5.5973	0.8368	0.002	0.726	-0.41983	0.34448	-0.34508	0.453637
630	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	1.3949	1	0	1	-0.52799	0.785743	-0.43401	1.125301
631	2	6	0.01	6	0.1	50	5	4	1	0	0	3	62.1435	0.7935	0.0031	0.5668	1.035473	0.227405	-0.29617	0.063386
632	2	6	0.1	1	0.1	50	45	14	9	0	0	3	4.0409	0.4915	0	1	-0.45989	-0.58915	-0.43401	1.125301
633	2	14	0.01	6	0.1	50	5	14	9	0	0	3	2.5931	0.9986	0.0269	0.5537	-0.49715	0.781957	0.762046	0.031273
634	2	14	0.1	1	0.1	150	45	4	9	0	0	3	3.7262	0.5707	0.0026	0.9081	-0.46799	-0.37501	-0.3184	0.900024
635	2	14	0.01	1	0.1	50	5	4	9	0	0	3	1.5106	1	0	1	-0.52501	0.785743	-0.43401	1.125301
636	-2	6	0.01	1	0.1	150	5	14	9	0	0	3	125.0119	0.9569	0.003	0.7482	2.653488	0.669208	-0.30062	0.508056
637	2	6	0.1	6	0.1	150	5	14	9	0	0	3	2.7186	0.6959	0.0011	0.7518	-0.49392	-0.03649	-0.3851	0.516881
638	2	14	0.1	6	0.1	150	5	4	1	0	0	3	3.2617	0.7661	0.001	0.8086	-0.47994	0.15332	-0.38955	0.656117
639	2	6	0.01	6	0.01	50	45	4	9	0	0	3	12.6233	0	0	0	-0.23901	-1.91807	-0.43401	-1.32603
640	2	6	0.01	6	0.01	150	5	14	1	0	0	3	1.5234	0.8264	0.0062	0.5434	-0.52468	0.31636	-0.15834	0.006025
641	-2	14	0.01	1	0.1	150	5	4	1	0	0	3	18.1901	0.9036	0.0006	0.9282	-0.09574	0.525095	-0.40733	0.949295
642	-2	6	0.1	1	0.01	50	5	14	1	0	0	3	4.1795	0.6218	0.0022	0.5362	-0.45632	-0.23684	-0.33619	-0.01162
643	-2	14	0.1	1	0.1	50	5	14	9	0	0	3	3.0839	0.5203	0.0001	0.9747	-0.48452	-0.51128	-0.42956	1.063282
644	2	14	0.1	6	0.01	150	45	4	9	0	0	3	114.8086	0.8906	0.0062	0.4991	2.39089	0.489945	-0.15834	-0.10257
645	-2	6	0.01	6	0.01	150	45	14	9	0	0	3	1.7054	1	0	1	-0.51999	0.785743	-0.43401	1.125301
646	2	14	0.01	1	0.01	150	45	4	1	0	0	3	98.9745	0.8875	0.0051	0.5499	1.983375	0.481564	-0.20725	0.021958
647	-2	14	0.01	6	0.01	150	45	14	1	0	0	3	3.5554	0.7487	0.0011	0.8066	-0.47238	0.106274	-0.3851	0.651214
648	2	14	0.01	6	0.1	150	45	14	1	0	0	3	2.3669	1	0.0416	0	-0.50297	0.785743	1.415652	-1.32603
649	2	6	0.1	1	0.01	50	5	4	1	0	0	3	5.7825	0.3362	0.0038	0.266	-0.41506	-1.00905	-0.26505	-0.67397
650	-2	6	0.1	1	0.01	150	45	4	9	0	0	3	7.5199	0.8105	0.0135	0.2055	-0.37035	0.27337	0.166242	-0.82228
651	-2	6	0.1	1	0.1	150	5	4	1	0	0	3	1.8718	0.9414	0.0013	0.9481	-0.51571	0.627299	-0.37621	0.998077
652	2	6	0.01	6	0.01	150	5	4	9	0	0	3	1.9066	0.9017	0.0005	0.9759	-0.51482	0.519958	-0.41178	1.066224
653	2	14	0.01	1	0.01	150	5	14	9	0	0	3	2.271	0.4636	0.0014	0.9228	-0.50544	-0.66458	-0.37176	0.936058
654	-2	6	0.01	1	0.1	150	45	14	1	0	0	3	166.1748	0	0	0	3.712878	-1.91807	-0.43401	-1.32603
655	-2	14	0.01	1	0.01	150	45	4	9	0	0	3	3.4436	0.9892	0.0658	0.367	-0.47526	0.756542	2.491656	-0.42639
656	-2	6	0.01	6	0.1	150	45	4	9	0	0	3	2.833	1	0	1	-0.49097	0.785743	-0.43401	1.125301
657	2	6	0.01	1	0.01	50	5	14	9	0	0	3	9.5645	0	0	0	-0.31773	-1.91807	-0.43401	-1.32603
658	-2	6	0.1	6	0.1	150	45	14	9	0	0	3	1.5111	1	0	1	-0.525	0.785743	-0.43401	1.125301
659	-2	14	0.1	1	0.01	50	5	4	1	0	0	3	4.7647	1	0.0055	0	-0.44126	0.785743	-0.18946	-1.32603
660	-2	6	0.1	6	0.01	150	45	4	1	0	0	3	1.9492	1	0	1	-0.51372	0.785743	-0.43401	1.125301
661	2	14	0.1	1	0.01	50	45	4	9	0	0	3	4.3378	0.8368	0.0019	0.7294	-0.45225	0.34448	-0.34953	0.461972
662	-2	14	0.1	6	0.01	50	45	14	9	0	0	3	117.7168	0.9749	0.0561	0.1817	2.465737	0.717877	2.060365	-0.88062
663	-2	14	0.1	6	0.1	50	5	14	1	0	0	3	115.2095	0.9711	0.0586	0.1277	2.401208	0.707603	2.171522	-1.01299
664	2	6	0.01	1	0.01	50	45	14	1	0	0	3	9.7017	0	0	0	-0.3142	-1.91807	-0.43401	-1.32603
665	2	6	0.1	6	0.1	150	45	4	1	0	0	3	98.9539	0.9683	0.0522	0.1298	1.982845	0.700032	1.886959	-1.00784
666	-2	14	0.1	6	0.01	150	5	14	9	0	0	3	2.4644	1	0.0048	0	-0.50046	0.785743	-0.22059	-1.32603
667	-2	14	0.01	1	0.1	50	45	14	9	0	0	3	2.4399	1	0.0059	0	-0.50109	0.785743	-0.17168	-1.32603
668	-2	14	0.01	6	0.01	50	5	4	9	0	0	3	22.8092	0	0	0	0.023144	-1.91807	-0.43401	-1.32603
669	2	14	0.1	6	0.1	50	45	4	1	0	0	3	18.9598	0	0	0	-0.07593	-1.91807	-0.43401	-1.32603
670	-2	6	0.01	6	0.1	50	45	14	1	0	0	3	8.7868	0	0	0	-0.33774	-1.91807	-0.43401	-1.32603
671	-2	6	0.1	1	0.1	50	45	4	1	0	0	3	1.9847	1	0	1	-0.51281	0.785743	-0.43401	1.125301
672	2	14	0.1	6	0.01	50	5	14	1	0	0	3	72.9	0.8246	0.0012	0.7877	1.312308	0.311494	-0.38065	0.604884
673	-2	6	0.01	1	0.01	50	5	4	1	0	0	3	2.7325	1	0	1	-0.49356	0.785743	-0.43401	1.125301
674	-2	6	0.1	6	0.1	50	5	4	9	0	0	3	5.8246	0.3362	0.0019	0.4202	-0.41398	-1.00905	-0.34953	-0.29598
675	2	14	0.1	1	0.01	150	45	14	1	0	0	3	2.2824	0.9835	0.0223	0.5763	-0.50514	0.74113	0.557516	0.086673
676	2	14	0.01	1	0.1	50	5	14	1	0	0	3	2.6953	0.8849	0.0007	0.969	-0.49452	0.474534	-0.40288	1.04931
677	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	3	1.7778	1	0	1	-0.51813	0.785743	-0.43401	1.125301
678	2	10	0.055	3.5	0.055	100	25	9	5	0	0	3	4.4202	1	0.0074	0	-0.45012	0.785743	-0.10498	-1.32603
679	0	6	0.055	3.5	0.055	100	25	9	5	0	0	3	2.844	1	0.0356	0	-0.49069	0.785743	1.148874	-1.32603
680	0	14	0.055	3.5	0.055	100	25	9	5	0	0	3	3.5372	0.8473	0.0001	0.9964	-0.47285	0.37287	-0.42956	1.116476
681	0	10	0.01	3.5	0.055	100	25	9	5	0	0	3	2.5509	1	0.0536	0	-0.49823	0.785743	1.949207	-1.32603
682	0	10	0.1	3.5	0.055	100	25	9	5	0	0	3	2.2127	0.9888	0.0557	0.3985	-0.50694	0.75546	2.04258	-0.34917
683	0	10	0.055	1	0.055	100	25	9	5	0	0	3	119.819	0.9167	0.0163	0.2862	2.519841	0.560515	0.290738	-0.62446
684	0	10	0.055	6	0.055	100	25	9	5	0	0	3	100.2759	0.9681	0.0766	0.0917	2.016869	0.699491	2.971856	-1.10124
685	0	10	0.055	3.5	0.01	100	25	9	5	0	0	3	2.3816	0.6034	0.0113	0.3699	-0.50259	-0.28659	0.068423	-0.41928
686	0	10	0.055	3.5	0.1	100	25	9	5	0	0	3	26.4592	0.8742	0.007	0.5366	0.117083	0.445603	-0.12277	-0.01064
687	0	10	0.055	3.5	0.055	50	25	9	5	0	0	3	1.2421	1	0	1	-0.53192	0.785743	-0.43401	1.125301
688	0	10	0.055	3.5	0.055	150	25	9	5	0	0	3	2.2951	1	0	1	-0.50482	0.785743	-0.43401	1.125301
689	0	10	0.055	3.5	0.055	100	5	9	5	0	0	3	2.5377	1	0	1	-0.49857	0.785743	-0.43401	1.125301
690	0	10	0.055	3.5	0.055	100	45	9	5	0	0	3	2.3706	1	0.0625	0	-0.50287	0.785743	2.344928	-1.32603
691	0	10	0.055	3.5	0.055	100	25	4	5	0	0	3	8.1166	0	0	0	-0.35499	-1.91807	-0.43401	-1.32603
692	0	10	0.055	3.5	0.055	100	25	14	5	0	0	3	2.6126	1	0.0492	0	-0.49665	0.785743	1.75357	-1.32603
693	0	10	0.055	3.5	0.055	100	25	9	1	0	0	3	64.9343	0.7922	0.002	0.663	1.107298	0.22389	-0.34508	0.299203
694	0	10	0.055	3.5	0.055	100	25	9	9	0	0	3	28.7078	0.7784	0.0065	0.5898	0.174954	0.186577	-0.145	0.119766
695	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	2.5593	0.8562	0.0121	0.4006	-0.49802	0.396934	0.103994	-0.34402
696	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	100.8161	0.9654	0.0471	0.1768	2.030772	0.692191	1.660198	-0.89263
697	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	78.6975	0.7149	0.0116	0.3289	1.461516	0.014885	0.081762	-0.51978
698	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	5.169	0.8825	0.0018	0.9483	-0.43085	0.468044	-0.35397	0.998567

699	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	5.6012	0.7892	0.0005	0.9068	-0.41973	0.215778	-0.41178	0.896837
700	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	3.8944	0.7688	0.0044	0.6308	-0.46366	0.160621	-0.23837	0.220271
701	2	6	0.01	6	0.1	50	5	4	1	1	1	3	1.9444	0.8707	0.0194	0.2889	-0.51384	0.436139	0.428573	-0.61784
702	2	6	0.1	1	0.1	50	45	14	9	1	1	3	1.9724	0.8654	0.0005	0.9747	-0.51312	0.421809	-0.41178	1.063282
703	2	14	0.01	6	0.1	50	5	14	9	1	1	3	4.3966	0	0.0064	0	-0.45073	-1.91807	-0.14945	-1.32603
704	2	14	0.1	1	0.1	150	45	4	9	1	1	3	4.3939	0.8696	0.0044	0.5072	-0.4508	0.433165	-0.23837	-0.08271
705	2	14	0.01	1	0.1	50	5	4	9	1	1	3	111.8725	0.905	0.0094	0.4072	2.315325	0.52888	-0.01606	-0.32785
706	-2	6	0.01	1	0.1	150	5	14	9	1	1	3	64.8079	0.8052	0.0024	0.6263	1.104045	0.25904	-0.3273	0.20924
707	2	6	0.1	6	0.1	150	5	14	9	1	1	3	18.0028	0	0	0	-0.10056	-1.91807	-0.43401	-1.32603
708	2	14	0.1	6	0.1	150	5	4	1	1	1	3	2.5274	1	0.0096	0	-0.49884	0.785743	-0.00716	-1.32603
709	2	6	0.01	6	0.01	50	45	4	9	1	1	3	3.2876	1	0	1	-0.47927	0.785743	-0.43401	1.125301
710	2	6	0.01	6	0.01	150	5	14	1	1	1	3	2.6526	1	0	1	-0.49562	0.785743	-0.43401	1.125301
711	-2	14	0.01	1	0.1	150	5	4	1	1	1	3	29.4438	0	0	0	0.193896	-1.91807	-0.43401	-1.32603
712	-2	6	0.1	1	0.01	50	5	14	1	1	1	3	4.5321	1	0	1	-0.44725	0.785743	-0.43401	1.125301
713	-2	14	0.1	1	0.1	50	5	14	9	1	1	3	6.359	0.3362	0.0019	0.4202	-0.40023	-1.00905	-0.34953	-0.29598
714	2	14	0.1	6	0.01	150	45	4	9	1	1	3	1.2999	1	0.0018	0	-0.53043	0.785743	-0.35397	-1.32603
715	-2	6	0.01	6	0.01	150	45	14	9	1	1	3	4.2763	0.8825	0.0018	0.9483	-0.45383	0.468044	-0.35397	0.998567
716	2	14	0.01	1	0.01	150	45	4	1	1	1	3	122.936	0.9576	0.0033	0.7471	2.600061	0.671101	-0.28728	0.50536
717	-2	14	0.01	6	0.01	150	45	14	1	1	1	3	1.2301	1	0	1	-0.53223	0.785743	-0.43401	1.125301
718	2	14	0.01	6	0.1	150	45	14	1	1	1	3	1.6698	0.9617	0.0863	0.1117	-0.52091	0.682187	3.403147	-1.05221
719	2	6	0.1	1	0.01	50	5	4	1	1	1	3	1.8518	1	0	1	-0.51623	0.785743	-0.43401	1.125301
720	-2	6	0.1	1	0.01	150	45	4	9	1	1	3	113.3085	0.905	0.0028	0.7011	2.352283	0.52888	-0.30951	0.392599
721	-2	6	0.1	1	0.1	150	5	4	1	1	1	3	3.0662	0.9812	0.0002	0.9942	-0.48497	0.734911	-0.42512	1.111083
722	2	6	0.01	6	0.01	150	5	4	9	1	1	3	2.9672	1	0	1	-0.48752	0.785743	-0.43401	1.125301
723	2	14	0.01	1	0.01	150	5	14	9	1	1	3	96.267	0	0	0	1.913694	-1.91807	-0.43401	-1.32603
724	-2	6	0.01	1	0.1	150	45	14	1	1	1	3	124.9481	0.9569	0.003	0.7482	2.651846	0.669208	-0.30062	0.508056
725	-2	14	0.01	1	0.01	150	45	4	9	1	1	3	113.5743	0.9077	0.003	0.6839	2.359124	0.536181	-0.30062	0.350436
726	-2	6	0.01	6	0.1	150	45	4	9	1	1	3	1.2726	1	0	1	-0.53113	0.785743	-0.43401	1.125301
727	2	6	0.01	1	0.01	50	5	14	9	1	1	3	2.0143	1	0	1	-0.51204	0.785743	-0.43401	1.125301
728	-2	6	0.1	6	0.1	150	45	14	9	1	1	3	3.0278	0.8566	0.0004	0.9808	-0.48596	0.398016	-0.41622	1.078235
729	-2	14	0.1	1	0.01	50	5	4	1	1	1	3	26.4589	0.8758	0.0156	0.3463	0.117075	0.449929	0.259614	-0.47713
730	-2	6	0.1	6	0.01	150	45	4	1	1	1	3	2.5552	1	0	1	-0.49812	0.785743	-0.43401	1.125301
731	2	14	0.1	1	0.01	50	45	4	9	1	1	3	26.4404	0.8649	0.0076	0.51	0.116599	0.420457	-0.09609	-0.07585
732	-2	14	0.1	6	0.01	50	45	14	9	1	1	3	5.3483	0.2191	0.0016	0.8286	-0.42624	-1.32567	-0.36287	0.705143
733	-2	14	0.1	6	0.1	50	5	14	1	1	1	3	24.8836	0	0	0	0.076532	-1.91807	-0.43401	-1.32603
734	2	6	0.01	1	0.01	50	45	14	1	1	1	3	66.6817	0	0	0	1.15227	-1.91807	-0.43401	-1.32603
735	2	6	0.1	6	0.1	150	45	4	1	1	1	3	2.69	1	0	1	-0.49465	0.785743	-0.43401	1.125301
736	-2	14	0.1	6	0.01	150	5	14	9	1	1	3	148.9675	0	0	0	3.270022	-1.91807	-0.43401	-1.32603
737	-2	14	0.01	1	0.1	50	45	14	9	1	1	3	11.6851	0	0	0	-0.26315	-1.91807	-0.43401	-1.32603
738	-2	14	0.01	6	0.01	50	5	4	9	1	1	3	1.9437	1	0	1	-0.51386	0.785743	-0.43401	1.125301
739	2	14	0.1	6	0.1	50	45	4	1	1	1	3	6.1205	0	0	0	-0.40637	-1.91807	-0.43401	-1.32603
740	-2	6	0.01	6	0.1	50	45	14	1	1	1	3	120.0349	0.9167	0.0163	0.2862	2.525397	0.560515	0.290738	-0.62446
741	-2	6	0.1	1	0.1	50	45	4	1	1	1	3	2.2579	1	0	1	-0.50578	0.785743	-0.43401	1.125301
742	2	14	0.1	6	0.01	50	5	14	1	1	1	3	2.0954	0.9452	0.0015	0.9436	-0.50996	0.637574	-0.36731	0.987046
743	-2	6	0.01	1	0.01	50	5	4	1	1	1	3	2.4595	1	0	1	-0.50059	0.785743	-0.43401	1.125301
744	-2	6	0.1	6	0.1	50	5	4	9	1	1	3	7.1467	0.3362	0.0019	0.4202	-0.37995	-1.00905	-0.34953	-0.29598
745	2	14	0.1	1	0.01	150	45	14	1	1	1	3	114.1915	0.9742	0.0331	0.1953	2.375008	0.715984	1.037716	-0.84728
746	2	14	0.01	1	0.1	50	5	14	1	1	1	3	2.3993	0.7515	0.0008	0.9071	-0.50214	0.113845	-0.39844	0.897572
747	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	3	2.3825	0.8858	0.0005	0.9773	-0.50257	0.476967	-0.41178	1.069656
748	2	10	0.055	3.5	0.055	100	25	9	5	1	1	3	2.6399	0.8682	0.0006	0.9726	-0.49594	0.42938	-0.40733	1.058134
749	0	6	0.055	3.5	0.055	100	25	9	5	1	1	3	2.5749	0.9561	0.0056	0.8669	-0.49762	0.667045	-0.18502	0.799029
750	0	14	0.055	3.5	0.055	100	25	9	5	1	1	3	170.8368	0	0	0	3.832862	-1.91807	-0.43401	-1.32603
751	0	10	0.01	3.5	0.055	100	25	9	5	1	1	3	9.5196	0	0	0	-0.31888	-1.91807	-0.43401	-1.32603
752	0	10	0.1	3.5	0.055	100	25	9	5	1	1	3	1.6501	1	0	1	-0.52142	0.785743	-0.43401	1.125301
753	0	10	0.055	1	0.055	100	25	9	5	1	1	3	3.787	0.4683	0.0018	0.9049	-0.46642	-0.65188	-0.35397	0.892179
754	0	10	0.055	6	0.055	100	25	9	5	1	1	3	68.537	0.5673	0.0005	0.8739	1.200019	-0.3842	-0.41178	0.816188
755	0	10	0.055	3.5	0.01	100	25	9	5	1	1	3	2.5569	1	0	1	-0.49808	0.785743	-0.43401	1.125301
756	0	10	0.055	3.5	0.1	100	25	9	5	1	1	3	115.1557	0.974	0.031	0.2048	2.399823	0.715444	0.944344	-0.82399
757	0	10	0.055	3.5	0.055	50	25	9	5	1	1	3	3.6053	0.8385	0.002	0.6888	-0.4711	0.349077	-0.34508	0.362448
758	0	10	0.055	3.5	0.055	150	25	9	5	1	1	3	5.7135	1	0.0042	0	-0.41684	0.785743	-0.24726	-1.32603
759	0	10	0.055	3.5	0.055	100	5	9	5	1	1	3	11.9535	0	0	0	-0.25624	-1.91807	-0.43401	-1.32603
760	0	10	0.055	3.5	0.055	100	45	9	5	1	1	3	22.5505	0	0	0	0.016486	-1.91807	-0.43401	-1.32603
761	0	10	0.055	3.5	0.055	100	25	4	5	1	1	3	1.2303	1	0	1	-0.53222	0.785743	-0.43401	1.125301
762	0	10	0.055	3.5	0.055	100	25	14	5	1	1	3	18.408	0	0	0	-0.09013	-1.91807	-0.43401	-1.32603
763	0	10	0.055	3.5	0.055	100	25	9	1	1	1	3	2.1089	0.8325	0.0727	0.1189	-0.50961	0.332854	2.79845	-1.03456
764	0	10	0.055	3.5	0.055	100	25	9	9	1	1	3	3.8956	0.9986	0.0275	0.5464	-0.46363	0.781957	0.788724	0.013379
765	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	119.0318	0.9107	0.0089	0.4221	2.499581	0.544292	-0.03829	-0.29132
766	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	4.1011	0.6092	0.0001	0.9942	-0.45834	-0.27091	-0.42956	1.111083
767	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	121.1326	0.9273	0.0413	0.2483	2.553648	0.589175	1.402313	-0.71736
768	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	2.4396	1	0	1	-0.5011	0.785743	-0.43401	1.125301
769	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	19.4151	0	0	0	-0.06421	-1.91807	-0.43401	-1.32603
770	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	1.7213	0.8846	0.0111	0.4326	-0.51959	0.473722	0.059531	-0.26558
771	2	6	0.01	6	0.1	50	5	4	1	0	1	3	115.1835	0.9305	0.0018	0.8056	2.400539	0.597828	-0.35397	0.648763

772	2	6	0.1	1	0.1	50	45	14	9	0	1	3	6.4967	0.3362	0.0019	0.4202	-0.39668	-1.00905	-0.34953	-0.29598
773	2	14	0.01	6	0.1	50	5	14	9	0	1	3	5.0578	1	0.0062	0	-0.43372	0.785743	-0.15834	-1.32603
774	2	14	0.1	1	0.1	150	45	4	9	0	1	3	1.9278	1	0	1	-0.51427	0.785743	-0.43401	1.125301
775	2	14	0.01	1	0.1	50	5	4	9	0	1	3	6.4099	0.8122	0.0067	0.8444	-0.39892	0.277966	-0.13611	0.743874
776	-2	6	0.01	1	0.1	150	5	14	9	0	1	3	2.598	1	0.0136	0	-0.49702	0.785743	0.170688	-1.32603
777	2	6	0.1	6	0.1	150	5	14	9	0	1	3	1.9833	0.8194	0.0041	0.6413	-0.51284	0.297434	-0.25171	0.24601
778	2	14	0.1	6	0.1	150	5	4	1	0	1	3	2.3665	0.5948	0.0009	0.8667	-0.50298	-0.30984	-0.39399	0.798539
779	2	6	0.01	6	0.01	50	45	4	9	0	1	3	3.087	1	0	1	-0.48444	0.785743	-0.43401	1.125301
780	2	6	0.01	6	0.01	150	5	14	1	0	1	3	100.0568	0.9677	0.0607	0.112	2.01123	0.69841	2.264894	-1.05148
781	-2	14	0.01	1	0.1	150	5	4	1	0	1	3	2.082	0.9572	0.1251	0.0811	-0.5103	0.670019	5.12831	-1.12722
782	-2	6	0.1	1	0.01	50	5	14	1	0	1	3	4.8697	1	0.0053	0	-0.43856	0.785743	-0.19835	-1.32603
783	-2	14	0.1	1	0.1	50	5	14	9	0	1	3	15.6896	0	0	0	-0.16009	-1.91807	-0.43401	-1.32603
784	2	14	0.1	6	0.01	150	45	4	9	0	1	3	2.736	0.815	0.0152	0.2327	-0.49347	0.285537	0.241829	-0.7556
785	-2	6	0.01	6	0.01	150	45	14	9	0	1	3	2.096	0.9631	0.0021	0.9226	-0.50994	0.685972	-0.34064	0.935568
786	2	14	0.01	1	0.01	150	45	4	1	0	1	3	4.7046	1	0	1	-0.44281	0.785743	-0.43401	1.125301
787	-2	14	0.01	6	0.01	150	45	14	1	0	1	3	2.0769	1	0	1	-0.51043	0.785743	-0.43401	1.125301
788	2	14	0.01	6	0.1	150	45	14	1	0	1	3	120.5344	0.8194	0.002	0.7709	2.538252	0.297434	-0.34508	0.563702
789	2	6	0.1	1	0.01	50	5	4	1	0	1	3	1.2442	1	0	1	-0.53186	0.785743	-0.43401	1.125301
790	-2	6	0.1	1	0.01	150	45	4	9	0	1	3	11.117	0	0	0	-0.27777	-1.91807	-0.43401	-1.32603
791	-2	6	0.1	1	0.1	150	5	4	1	0	1	3	2.5426	0.8218	0	1	-0.49845	0.303923	-0.43401	1.125301
792	2	6	0.01	6	0.01	150	5	4	9	0	1	3	123.4932	0.9525	0.0011	0.8833	2.614402	0.657312	-0.3851	0.839231
793	2	14	0.01	1	0.01	150	5	14	9	0	1	3	5.3328	0	0.0012	0	-0.42664	-1.91807	-0.38065	-1.32603
794	-2	6	0.01	1	0.1	150	45	14	1	0	1	3	27.0817	0	0	0	0.133104	-1.91807	-0.43401	-1.32603
795	-2	14	0.01	1	0.01	150	45	4	9	0	1	3	6.5659	0.7976	0.0019	0.648	-0.3949	0.238491	-0.34953	0.262434
796	-2	6	0.01	6	0.1	150	45	4	9	0	1	3	7.1727	0	0	0	-0.37929	-1.91807	-0.43401	-1.32603
797	2	6	0.01	1	0.01	50	5	14	9	0	1	3	100.8563	0.9649	0.0566	0.1182	2.031806	0.690839	2.082596	-1.03628
798	-2	6	0.1	6	0.1	150	45	14	9	0	1	3	73.055	0.8165	0.0019	0.6862	1.316297	0.289593	-0.34953	0.356074
799	-2	14	0.1	1	0.01	50	5	4	1	0	1	3	3.6272	0.6959	0.0015	0.6913	-0.47053	-0.03649	-0.36731	0.368576
800	-2	6	0.1	6	0.01	150	45	4	1	0	1	3	3.0716	0.7688	0.0039	0.6578	-0.48483	0.160621	-0.2606	0.286457
801	2	14	0.1	1	0.01	50	45	4	9	0	1	3	62.7653	0.8065	0.0035	0.5388	1.051476	0.262554	-0.27839	-0.00525
802	-2	14	0.1	6	0.01	50	45	14	9	0	1	3	26.5803	0	0	0	0.120199	-1.91807	-0.43401	-1.32603
803	-2	14	0.1	6	0.1	50	5	14	1	0	1	3	1.9778	1	0	1	-0.51298	0.785743	-0.43401	1.125301
804	2	6	0.01	1	0.01	50	45	14	1	0	1	3	15.2221	0	0	0	-0.17212	-1.91807	-0.43401	-1.32603
805	2	6	0.1	6	0.1	150	45	4	1	0	1	3	2.7657	1	0.0508	0.4078	-0.49271	0.785743	1.824711	-0.32638
806	-2	14	0.1	6	0.01	150	5	14	9	0	1	3	1.9908	1	0	1	-0.51265	0.785743	-0.43401	1.125301
807	-2	14	0.01	1	0.1	50	45	14	9	0	1	3	2.8672	1	0	1	-0.49009	0.785743	-0.43401	1.125301
808	-2	14	0.01	6	0.01	50	5	4	9	0	1	3	26.5002	0.8758	0.0146	0.3612	0.118138	0.449929	0.215151	-0.44061
809	2	14	0.1	6	0.1	50	45	4	1	0	1	3	1.7304	0.963	0.0017	0.9366	-0.51935	0.685702	-0.35842	0.969887
810	-2	6	0.01	6	0.1	50	45	14	1	0	1	3	2.2424	0.9415	0.0017	0.9365	-0.50617	0.62757	-0.35842	0.969641
811	-2	6	0.1	1	0.1	50	45	4	1	0	1	3	3.9863	0.4208	0	0.9977	-0.46129	-0.78031	-0.43401	1.119663
812	2	14	0.1	6	0.01	50	5	14	1	0	1	3	98.8806	0.9636	0.0473	0.143	1.980959	0.687324	1.669091	-0.97549
813	-2	6	0.01	1	0.01	50	5	4	1	0	1	3	2.1203	1	0.0563	0	-0.50932	0.785743	2.069257	-1.32603
814	-2	6	0.1	6	0.1	50	5	4	9	0	1	3	3.1249	0.8487	0.0005	0.9808	-0.48346	0.376655	-0.41178	1.078235
815	2	14	0.1	1	0.01	150	45	14	1	0	1	3	4.4244	0	0	0	-0.45002	-1.91807	-0.43401	-1.32603
816	2	14	0.01	1	0.1	50	5	14	1	0	1	3	2.2663	0.7443	0.0002	0.9906	-0.50556	0.094377	-0.42512	1.102258
817	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	3	1.6365	1	0	1	-0.52177	0.785743	-0.43401	1.125301
818	2	10	0.055	3.5	0.055	100	25	9	5	0	1	3	2.2116	1	0.0094	0	-0.50697	0.785743	-0.01606	-1.32603
819	0	6	0.055	3.5	0.055	100	25	9	5	0	1	3	4.0379	0	0.0165	0	-0.45996	-1.91807	0.299631	-1.32603
820	0	14	0.055	3.5	0.055	100	25	9	5	0	1	3	5.4992	0	0.0065	0	-0.42236	-1.91807	-0.145	-1.32603
821	0	10	0.01	3.5	0.055	100	25	9	5	0	1	3	62.7494	0.8141	0.001	0.7987	1.051067	0.283103	-0.38955	0.631849
822	0	10	0.1	3.5	0.055	100	25	9	5	0	1	3	5.1586	0	0	0	-0.43112	-1.91807	-0.43401	-1.32603
823	0	10	0.055	1	0.055	100	25	9	5	0	1	3	105.2665	0.8589	0.0044	0.5789	2.14531	0.404234	-0.23837	0.093047
824	0	10	0.055	6	0.055	100	25	9	5	0	1	3	1.4274	1	0	1	-0.52715	0.785743	-0.43401	1.125301
825	0	10	0.055	3.5	0.01	100	25	9	5	0	1	3	3.7813	0.8826	0.0018	0.9474	-0.46657	0.468315	-0.35397	0.996361
826	0	10	0.055	3.5	0.1	100	25	9	5	0	1	3	4.0705	0.4566	0.0011	0.9386	-0.45912	-0.68351	-0.3851	0.974789
827	0	10	0.055	3.5	0.055	50	25	9	5	0	1	3	24.5826	1	0	1	0.068785	0.785743	-0.43401	1.125301
828	0	10	0.055	3.5	0.055	150	25	9	5	0	1	3	4.4206	0.8696	0.0046	0.4965	-0.45011	0.433165	-0.22948	-0.10894
829	0	10	0.055	3.5	0.055	100	5	9	5	0	1	3	2.648	0.4655	0.0018	0.9044	-0.49574	-0.65945	-0.35397	0.890954
830	0	10	0.055	3.5	0.055	100	45	9	5	0	1	3	118.1739	0.9675	0.0439	0.2159	2.477501	0.697869	1.517916	-0.79678
831	0	10	0.055	3.5	0.055	100	25	4	5	0	1	3	115.3133	0.8882	0.0048	0.5665	2.403879	0.483456	-0.22059	0.06265
832	0	10	0.055	3.5	0.055	100	25	14	5	0	1	3	114.0285	0.8886	0.0072	0.466	2.370813	0.484538	-0.11387	-0.18371
833	0	10	0.055	3.5	0.055	100	25	9	1	0	1	3	4.483	0.74	0.0007	0.8346	-0.44851	0.082751	-0.40288	0.719851
834	0	10	0.055	3.5	0.055	100	25	9	9	0	1	3	3.6084	0.8494	0.0025	0.6528	-0.47102	0.378548	-0.32285	0.2742
835	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	13.2412	0	0	0	-0.2231	-1.91807	-0.43401	-1.32603
836	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	1.6279	1	0	1	-0.52199	0.785743	-0.43401	1.125301
837	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	3.7607	0.967	0.0156	0.7433	-0.4671	0.696517	0.259614	0.496045
838	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	3.7607	0.4293	0.0001	0.9933	-0.4671	-0.75732	-0.42956	1.108877
839	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	3.0298	1	0	1	-0.48591	0.785743	-0.43401	1.125301
840	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	65.1351	0.7922	0.0041	0.4939	1.112466	0.22389	-0.25171	-0.11532

Table A.3 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 3) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 4)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
841	2	6	0.01	6	0.1	50	5	4	1	1	0	4	3.9916	0.8825	0.0018	0.9483	-0.46116	0.468044	-0.35397	0.998567
842	2	6	0.1	1	0.1	50	45	14	9	1	0	4	15.3932	0	0	0	-0.16772	-1.91807	-0.43401	-1.32603
843	2	14	0.01	6	0.1	50	5	14	9	1	0	4	4.02	0	0	0	-0.46042	-1.91807	-0.43401	-1.32603
844	2	14	0.1	1	0.1	150	45	4	9	1	0	4	3.3424	0.8489	0.0007	0.974	-0.47786	0.377196	-0.40288	1.061566
845	2	14	0.01	1	0.1	50	5	4	9	1	0	4	2.6941	0.8596	0.0004	0.9808	-0.49455	0.406127	-0.41622	1.078235
846	-2	6	0.01	1	0.1	150	5	14	9	1	0	4	6.6086	0.9777	0.0081	0.43	-0.3938	0.725448	-0.07386	-0.27196
847	2	6	0.1	6	0.1	150	5	14	9	1	0	4	62.9869	0.8408	0.0077	0.3587	1.057179	0.355295	-0.09164	-0.44674
848	2	14	0.1	6	0.1	150	5	4	1	1	0	4	2.6022	0.9818	0.0166	0.6421	-0.49691	0.736533	0.304077	0.247971
849	2	6	0.01	6	0.01	50	45	4	9	1	0	4	100.31	0.9679	0.0699	0.0991	2.017746	0.69895	2.673954	-1.0831
850	2	6	0.01	6	0.01	150	5	14	1	1	0	4	99.968	0.9677	0.0556	0.1209	2.008945	0.69841	2.038133	-1.02966
851	-2	14	0.01	1	0.1	150	5	4	1	1	0	4	19.6047	0	0	0	-0.05933	-1.91807	-0.43401	-1.32603
852	-2	6	0.1	1	0.01	50	5	14	1	1	0	4	165.754	0	0	0	3.702048	-1.91807	-0.43401	-1.32603
853	-2	14	0.1	1	0.1	50	5	14	9	1	0	4	3.2081	0.5203	0.0004	0.9167	-0.48132	-0.51128	-0.41622	0.921105
854	2	14	0.1	6	0.01	150	45	4	9	1	0	4	18.0492	0.8921	0.0003	0.9658	-0.09936	0.494001	-0.42067	1.041465
855	-2	6	0.01	6	0.01	150	45	14	9	1	0	4	113.8874	0.8886	0.0072	0.466	2.367182	0.484538	-0.11387	-0.18371
856	2	14	0.01	1	0.01	150	45	4	1	1	0	4	5.4242	0	0	0	-0.42429	-1.91807	-0.43401	-1.32603
857	-2	14	0.01	6	0.01	150	45	14	1	1	0	4	4.551	0.9663	0.0053	0.8741	-0.44676	0.694624	-0.19835	0.816679
858	2	14	0.01	6	0.1	150	45	14	1	1	0	4	3.2885	1	0.036	0	-0.47925	0.785743	1.166659	-1.32603
859	2	6	0.1	1	0.01	50	5	4	1	1	0	4	1.4883	1	0	1	-0.52558	0.785743	-0.43401	1.125301
860	-2	6	0.1	1	0.01	150	45	4	9	1	0	4	66.2345	0.7922	0.0021	0.6559	1.140761	0.22389	-0.34064	0.281799
861	-2	6	0.1	1	0.1	150	5	4	1	1	0	4	9.6321	0	0	0	-0.31599	-1.91807	-0.43401	-1.32603
862	2	6	0.01	6	0.01	150	5	4	9	1	0	4	3.418	1	0.0062	0	-0.47592	0.785743	-0.15834	-1.32603
863	2	14	0.01	1	0.01	150	5	14	9	1	0	4	2.2854	0.9548	0.0824	0.1123	-0.50507	0.66353	3.229741	-1.05074
864	-2	6	0.01	1	0.1	150	45	14	1	1	0	4	176.7845	0	0	0	3.985935	-1.91807	-0.43401	-1.32603
865	-2	14	0.01	1	0.01	150	45	4	9	1	0	4	2.633	1	0.0045	0	-0.49612	0.785743	-0.23392	-1.32603
866	-2	6	0.01	6	0.1	150	45	4	9	1	0	4	182.3727	0	0	0	4.129756	-1.91807	-0.43401	-1.32603
867	2	6	0.01	1	0.01	50	5	14	9	1	0	4	6.8347	0	0	0	-0.38798	-1.91807	-0.43401	-1.32603
868	-2	6	0.1	6	0.1	150	45	14	9	1	0	4	1.2688	1	0.0554	0	-0.53123	0.785743	2.029241	-1.32603
869	-2	14	0.1	1	0.01	50	5	4	1	1	0	4	3.4215	0.8432	0.0001	0.9963	-0.47583	0.361785	-0.42956	1.116231
870	-2	6	0.1	6	0.01	150	45	4	1	1	0	4	1.2605	1	0	1	-0.53144	0.785743	-0.43401	1.125301
871	2	14	0.1	1	0.01	50	45	4	9	1	0	4	2.9762	0.6959	0.0011	0.7518	-0.48729	-0.03649	-0.3851	0.516881
872	-2	14	0.1	6	0.01	50	45	14	9	1	0	4	29.0999	0.768	0.0057	0.6183	0.185045	0.158458	-0.18057	0.189629
873	-2	14	0.1	6	0.1	50	5	14	1	1	0	4	2.1795	0.4518	0	0.9979	-0.50779	-0.69649	-0.43401	1.120153
874	2	6	0.01	1	0.01	50	45	14	1	1	0	4	5.568	0.168	0	1	-0.42058	-1.46383	-0.43401	1.125301
875	2	6	0.1	6	0.1	150	45	4	1	1	0	4	1.992	1	0	1	-0.51262	0.785743	-0.43401	1.125301
876	-2	14	0.1	6	0.01	150	5	14	9	1	0	4	4.6216	0.709	0.0029	0.5118	-0.44494	-0.00107	-0.30507	-0.07144
877	-2	14	0.01	1	0.1	50	45	14	9	1	0	4	4.8661	0.6032	0	1	-0.43865	-0.28713	-0.43401	1.125301
878	-2	14	0.01	6	0.01	50	5	4	9	1	0	4	1.4645	1	0	1	-0.52619	0.785743	-0.43401	1.125301
879	2	14	0.1	6	0.1	50	45	4	1	1	0	4	1.9263	0.8846	0.0111	0.4326	-0.51431	0.473722	0.059531	-0.26558
880	-2	6	0.01	6	0.1	50	45	14	1	1	0	4	34.078	0	0	0	0.313164	-1.91807	-0.43401	-1.32603
881	-2	6	0.1	1	0.1	50	45	4	1	1	0	4	3.5922	0.8483	0.0003	0.9894	-0.47143	0.375574	-0.42067	1.099317
882	2	14	0.1	6	0.01	50	5	14	1	1	0	4	120.417	0.9167	0.0163	0.2862	2.535231	0.560515	0.290738	-0.62446
883	-2	6	0.01	1	0.01	50	5	4	1	1	0	4	2.9448	0	0	0	-0.4881	-1.91807	-0.43401	-1.32603
884	-2	6	0.1	6	0.1	50	5	4	9	1	0	4	4.7105	0.6468	0.0002	0.9896	-0.44265	-0.16924	-0.42512	1.099807
885	2	14	0.1	1	0.01	150	45	14	1	1	0	4	3.7521	0.9428	0.0022	0.9411	-0.46732	0.631085	-0.33619	0.980917
886	2	14	0.01	1	0.1	50	5	14	1	1	0	4	3.1061	1	0.004	0	-0.48395	0.785743	-0.25616	-1.32603
887	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	4	1.6386	1	0	1	-0.52171	0.785743	-0.43401	1.125301
888	2	10	0.055	3.5	0.055	100	25	9	5	1	0	4	4.1442	0	0.0012	0	-0.45723	-1.91807	-0.38065	-1.32603
889	0	6	0.055	3.5	0.055	100	25	9	5	1	0	4	2.0581	1	0	1	-0.51092	0.785743	-0.43401	1.125301
890	0	14	0.055	3.5	0.055	100	25	9	5	1	0	4	1.4019	1	0	1	-0.52781	0.785743	-0.43401	1.125301
891	0	10	0.01	3.5	0.055	100	25	9	5	1	0	4	11.4418	0	0	0	-0.26941	-1.91807	-0.43401	-1.32603
892	0	10	0.1	3.5	0.055	100	25	9	5	1	0	4	8.9668	0	0	0	-0.33311	-1.91807	-0.43401	-1.32603
893	0	10	0.055	1	0.055	100	25	9	5	1	0	4	1.6439	0.9607	0.0537	0.1641	-0.52158	0.679483	1.953654	-0.92376
894	0	10	0.055	6	0.055	100	25	9	5	1	0	4	10.9482	0	0	0	-0.28212	-1.91807	-0.43401	-1.32603
895	0	10	0.055	3.5	0.01	100	25	9	5	1	0	4	10.7227	0	0.0032	0	-0.28792	-1.91807	-0.29173	-1.32603
896	0	10	0.055	3.5	0.1	100	25	9	5	1	0	4	3.815	1	0.0074	0	-0.4657	0.785743	-0.10498	-1.32603
897	0	10	0.055	3.5	0.055	50	25	9	5	1	0	4	25.7475	1	0	1	0.098766	0.785743	-0.43401	1.125301
898	0	10	0.055	3.5	0.055	150	25	9	5	1	0	4	101.636	0.9677	0.0584	0.1156	2.051873	0.69841	2.16263	-1.04265
899	0	10	0.055	3.5	0.055	100	5	9	5	1	0	4	104.5729	0	0	0	2.127459	-1.91807	-0.43401	-1.32603
900	0	10	0.055	3.5	0.055	100	45	9	5	1	0	4	4.0571	0	0.0015	0	-0.45947	-1.91807	-0.36731	-1.32603
901	0	10	0.055	3.5	0.055	100	25	4	5	1	0	4	3.9238	0.6218	0.0022	0.5362	-0.4629	-0.23684	-0.33619	-0.01162
902	0	10	0.055	3.5	0.055	100	25	14	5	1	0	4	3.6008	0.8439	0.0003	0.9891	-0.47121	0.363677	-0.42067	1.098581
903	0	10	0.055	3.5	0.055	100	25	9	1	1	0	4	4.8751	0.8032	0.0157	0.7073	-0.43842	0.253632	0.26406	0.407797
904	0	10	0.055	3.5	0.055	100	25	9	9	1	0	4	119.3926	0.9107	0.0094	0.4091	2.508866	0.544292	-0.01606	-0.32319
905	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	79.2803	0.7195	0.0492	0.1055	1.476515	0.027323	1.75357	-1.06741

906	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	3.6664	0.8385	0.002	0.6853	-0.46953	0.349077	-0.34508	0.353868
907	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	1.863	1	0	1	-0.51594	0.785743	-0.43401	1.125301
908	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	4.8386	0	0	0	-0.43936	-1.91807	-0.43401	-1.32603
909	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	3.6386	0.8144	0.0111	0.2857	-0.47024	0.283915	0.059531	-0.62568
910	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	3.9735	0.9663	0.0053	0.8741	-0.46162	0.694624	-0.19835	0.816679
911	2	6	0.01	6	0.1	50	5	4	1	0	0	4	5.1565	0.8368	0.0022	0.7004	-0.43118	0.34448	-0.33619	0.390883
912	2	6	0.1	1	0.1	50	45	14	9	0	0	4	2.6799	1	0.1516	0	-0.49491	0.785743	6.306579	-1.32603
913	2	14	0.01	6	0.1	50	5	14	9	0	0	4	2.8783	1	0.0048	0	-0.48981	0.785743	-0.22059	-1.32603
914	2	14	0.1	1	0.1	150	45	4	9	0	0	4	2.2144	1	0	1	-0.50689	0.785743	-0.43401	1.125301
915	2	14	0.01	1	0.1	50	5	4	9	0	0	4	147.4971	0	0	0	3.232179	-1.91807	-0.43401	-1.32603
916	-2	6	0.01	1	0.1	150	5	14	9	0	0	4	1.9903	0.782	0.0097	0.3985	-0.51266	0.196311	-0.00272	-0.34917
917	2	6	0.1	6	0.1	150	5	14	9	0	0	4	2.6384	1	0	1	-0.49598	0.785743	-0.43401	1.125301
918	2	14	0.1	6	0.1	150	5	4	1	0	0	4	119.5543	0.9045	0.0024	0.7266	2.513028	0.527528	-0.3273	0.455108
919	2	6	0.01	6	0.01	50	45	4	9	0	0	4	4.4527	0.8215	0	1	-0.44929	0.303112	-0.43401	1.125301
920	2	6	0.01	6	0.01	150	5	14	1	0	0	4	3.7462	0	0.0018	0	-0.46747	-1.91807	-0.35397	-1.32603
921	-2	14	0.01	1	0.1	150	5	4	1	0	0	4	3.3772	0	0	0	-0.47697	-1.91807	-0.43401	-1.32603
922	-2	6	0.1	1	0.01	50	5	14	1	0	0	4	4.2268	0.9273	0.0249	0.1573	-0.4551	0.589175	0.67312	-0.94043
923	-2	14	0.1	1	0.1	50	5	14	9	0	0	4	4.3062	0.8462	0.0001	0.9964	-0.45306	0.369896	-0.42956	1.116476
924	2	14	0.1	6	0.01	150	45	4	9	0	0	4	5.4812	0.1872	0.0019	0.2876	-0.42282	-1.41192	-0.34953	-0.62102
925	-2	6	0.01	6	0.01	150	45	14	9	0	0	4	10.0324	0	0	0	-0.30569	-1.91807	-0.43401	-1.32603
926	2	14	0.01	1	0.01	150	45	4	1	0	0	4	66.5807	0.8	0.0024	0.6294	1.149671	0.24498	-0.3273	0.216839
927	-2	14	0.01	6	0.01	150	45	14	1	0	0	4	113.944	0.8886	0.0072	0.466	2.368638	0.484538	-0.11387	-0.18371
928	2	14	0.01	6	0.1	150	45	14	1	0	0	4	2.4318	1	0	1	-0.5013	0.785743	-0.43401	1.125301
929	2	6	0.1	1	0.01	50	5	4	1	0	0	4	7.7628	0.017	0.015	0.0046	-0.3641	-1.87211	0.232936	-1.31475
930	-2	6	0.1	1	0.01	150	45	4	9	0	0	4	2.106	0.8707	0.0124	0.3879	-0.50968	0.436139	0.117333	-0.37516
931	-2	6	0.1	1	0.1	150	5	4	1	0	0	4	2.6501	0.4636	0.0014	0.9228	-0.49568	-0.66458	-0.37176	0.936058
932	2	6	0.01	6	0.01	150	5	4	9	0	0	4	5.9084	0	0	0	-0.41182	-1.91807	-0.43401	-1.32603
933	2	14	0.01	1	0.01	150	5	14	9	0	0	4	1.9322	0.9452	0.0017	0.9337	-0.51416	0.637574	-0.35842	0.962778
934	-2	6	0.01	1	0.1	150	45	14	1	0	0	4	1.5141	1	0	1	-0.52492	0.785743	-0.43401	1.125301
935	-2	14	0.01	1	0.01	150	45	4	9	0	0	4	4.0975	0.9663	0.0053	0.8741	-0.45843	0.694624	-0.19835	0.816679
936	-2	6	0.01	6	0.1	150	45	4	9	0	0	4	1.4914	1	0.0006	0	-0.5255	0.785743	-0.40733	-1.32603
937	2	6	0.01	1	0.01	50	5	14	9	0	0	4	4.7004	0.0681	0.028	0.0098	-0.44291	-1.73394	0.810955	-1.302
938	-2	6	0.1	6	0.1	150	45	14	9	0	0	4	2.4416	1	0	1	-0.50105	0.785743	-0.43401	1.125301
939	-2	14	0.1	1	0.01	50	5	4	1	0	0	4	3.9381	0.6577	0.0074	0.3925	-0.46253	-0.13977	-0.10498	-0.36388
940	-2	6	0.1	6	0.01	150	45	4	1	0	0	4	1.6509	0.956	0.103	0.0943	-0.5214	0.666775	4.145678	-1.09487
941	2	14	0.1	1	0.01	50	45	4	9	0	0	4	3.3354	0.4208	0	0.9977	-0.47804	-0.78031	-0.43401	1.119663
942	-2	14	0.1	6	0.01	50	45	14	9	0	0	4	4.8659	0.8826	0.0018	0.9474	-0.43865	0.468315	-0.35397	0.996361
943	-2	14	0.1	6	0.1	50	5	14	1	0	0	4	2.7176	1	0	1	-0.49394	0.785743	-0.43401	1.125301
944	2	6	0.01	1	0.01	50	45	14	1	0	0	4	113.8739	0.9751	0.049	0.1453	2.366834	0.718418	1.744678	-0.96985
945	2	6	0.1	6	0.1	150	45	4	1	0	0	4	1.7984	1	0	1	-0.5176	0.785743	-0.43401	1.125301
946	-2	14	0.1	6	0.01	150	5	14	9	0	0	4	2.2234	0.9548	0.0879	0.106	-0.50666	0.66353	3.474287	-1.06619
947	-2	14	0.01	1	0.1	50	45	14	9	0	0	4	2.4486	0.8224	0.0095	0.3769	-0.50087	0.305545	-0.01161	-0.40212
948	-2	14	0.01	6	0.01	50	5	4	9	0	0	4	67.5886	0.9594	0.1671	0.0357	1.175611	0.675968	6.995755	-1.23851
949	2	14	0.1	6	0.1	50	45	4	1	0	0	4	12.5306	0	0	0	-0.24139	-1.91807	-0.43401	-1.32603
950	-2	6	0.01	6	0.1	50	45	14	1	0	0	4	2.2961	0.9564	0.0082	0.817	-0.50479	0.667856	-0.06941	0.676708
951	-2	6	0.1	1	0.1	50	45	4	1	0	0	4	99.059	0.9683	0.0902	0.0796	1.98555	0.700032	3.576552	-1.1309
952	2	14	0.1	6	0.01	50	5	14	1	0	0	4	3.8645	0	0.0012	0	-0.46443	-1.91807	-0.38065	-1.32603
953	-2	6	0.01	1	0.01	50	5	4	1	0	0	4	1.148	1	0	1	-0.53434	0.785743	-0.43401	1.125301
954	-2	6	0.1	6	0.1	50	5	4	9	0	0	4	1.2183	1	0	1	-0.53253	0.785743	-0.43401	1.125301
955	2	14	0.1	1	0.01	150	45	14	1	0	0	4	11.065	0	0	0	-0.27911	-1.91807	-0.43401	-1.32603
956	2	14	0.01	1	0.1	50	5	14	1	0	0	4	1.5089	0.8194	0.0053	0.5784	-0.52505	0.297434	-0.19835	0.091821
957	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	4	1.4345	1	0	1	-0.52697	0.785743	-0.43401	1.125301
958	2	10	0.055	3.5	0.055	100	25	9	5	0	0	4	1.4831	1	0.0006	0	-0.52572	0.785743	-0.40733	-1.32603
959	0	6	0.055	3.5	0.055	100	25	9	5	0	0	4	2.7563	0.6959	0.0011	0.7518	-0.49295	-0.03649	-0.3851	0.516881
960	0	14	0.055	3.5	0.055	100	25	9	5	0	0	4	2.4313	0	0	0	-0.50131	-1.91807	-0.43401	-1.32603
961	0	10	0.01	3.5	0.055	100	25	9	5	0	0	4	4.3231	0.9841	0.0001	0.9984	-0.45262	0.742752	-0.42956	1.121379
962	0	10	0.1	3.5	0.055	100	25	9	5	0	0	4	1.7554	1	0	1	-0.51871	0.785743	-0.43401	1.125301
963	0	10	0.055	1	0.055	100	25	9	5	0	0	4	2.2328	1	0	1	-0.50642	0.785743	-0.43401	1.125301
964	0	10	0.055	6	0.055	100	25	9	5	0	0	4	3.1891	1	0	1	-0.48181	0.785743	-0.43401	1.125301
965	0	10	0.055	3.5	0.01	100	25	9	5	0	0	4	2.2453	1	0	1	-0.5061	0.785743	-0.43401	1.125301
966	0	10	0.055	3.5	0.1	100	25	9	5	0	0	4	19.9223	0	0	0	-0.05115	-1.91807	-0.43401	-1.32603
967	0	10	0.055	3.5	0.055	50	25	9	5	0	0	4	1.7159	1	0	1	-0.51972	0.785743	-0.43401	1.125301
968	0	10	0.055	3.5	0.055	150	25	9	5	0	0	4	120.2925	0.817	0.0016	0.8063	2.532027	0.290945	-0.36287	0.650479
969	0	10	0.055	3.5	0.055	100	5	9	5	0	0	4	1.5298	1	0	1	-0.52451	0.785743	-0.43401	1.125301
970	0	10	0.055	3.5	0.055	100	45	9	5	0	0	4	117.6432	0.8739	0.0046	0.5751	2.463843	0.444792	-0.22948	0.083732
971	0	10	0.055	3.5	0.055	100	25	4	5	0	0	4	3.025	0.5267	0.0005	0.908	-0.48603	-0.49397	-0.41178	0.899779
972	0	10	0.055	3.5	0.055	100	25	14	5	0	0	4	10.716	1	0	1	-0.28809	0.785743	-0.43401	1.125301
973	0	10	0.055	3.5	0.055	100	25	9	1	0	0	4	3.5253	0	0	0	-0.47316	-1.91807	-0.43401	-1.32603
974	0	10	0.055	3.5	0.055	100	25	9	9	0	0	4	2.5136	1	0	1	-0.49919	0.785743	-0.43401	1.125301
975	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	3.4974	0.8825	0.0018	0.9483	-0.47387	0.468044	-0.35397	0.998567
976	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	1.4785	1	0	1	-0.52583	0.785743	-0.43401	1.125301
977	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	2.1562	1	0	1	-0.50839	0.785743	-0.43401	1.125301
978	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	3.0924	0.8825	0.0018	0.9483	-0.4843	0.468044	-0.35397	0.998567

979	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	1.333	1	0	1	-0.52958	0.785743	-0.43401	1.125301
980	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	38.2498	0	0	0	0.420532	-1.91807	-0.43401	-1.32603
981	2	6	0.01	6	0.1	50	5	4	1	1	1	4	5.5002	0.8324	0.0013	0.7897	-0.42233	0.332583	-0.37621	0.609787
982	2	6	0.1	1	0.1	50	45	14	9	1	1	4	3.9895	0	0.0128	0	-0.46121	-1.91807	0.135118	-1.32603
983	2	14	0.01	6	0.1	50	5	14	9	1	1	4	3.1095	0.8479	0	0.9981	-0.48386	0.374492	-0.43401	1.120643
984	2	14	0.1	1	0.1	150	45	4	9	1	1	4	1.4651	1	0	1	-0.52618	0.785743	-0.43401	1.125301
985	2	14	0.01	1	0.1	50	5	4	9	1	1	4	96.2394	0.9616	0.0273	0.2148	1.912983	0.681916	0.779831	-0.79948
986	-2	6	0.01	1	0.1	150	5	14	9	1	1	4	1.273	1	0	1	-0.53112	0.785743	-0.43401	1.125301
987	2	6	0.1	6	0.1	150	5	14	9	1	1	4	26.4745	0.8742	0.0095	0.4599	0.117476	0.445603	-0.01161	-0.19866
988	2	14	0.1	6	0.1	150	5	4	1	1	1	4	119.3281	0	0	0	2.507206	-1.91807	-0.43401	-1.32603
989	2	6	0.01	6	0.01	50	45	4	9	1	1	4	113.2027	0.9083	0.01	0.3936	2.34956	0.537803	0.010621	-0.36118
990	2	6	0.01	6	0.01	150	5	14	1	1	1	4	3.8014	0.6218	0.0015	0.6325	-0.46605	-0.23684	-0.36731	0.224438
991	-2	14	0.01	1	0.1	150	5	4	1	1	1	4	2.7123	0.8826	0.0018	0.9474	-0.49408	0.468315	-0.35397	0.996361
992	-2	6	0.1	1	0.01	50	5	14	1	1	1	4	1.763	1	0	1	-0.51851	0.785743	-0.43401	1.125301
993	-2	14	0.1	1	0.1	50	5	14	9	1	1	4	26.4786	0.8758	0.0146	0.3612	0.117582	0.449929	0.215151	-0.44061
994	2	14	0.1	6	0.01	150	45	4	9	1	1	4	1.3867	1	0	1	-0.5282	0.785743	-0.43401	1.125301
995	-2	6	0.01	6	0.01	150	45	14	9	1	1	4	7.7158	0.2681	0.0011	0.4922	-0.36531	-1.19318	-0.3851	-0.11948
996	2	14	0.01	1	0.01	150	45	4	1	1	1	4	6.1809	0	0	0	-0.40481	-1.91807	-0.43401	-1.32603
997	-2	14	0.01	6	0.01	150	45	14	1	1	1	4	2.4859	0.782	0.0086	0.4262	-0.49991	0.196311	-0.05163	-0.28127
998	2	14	0.01	6	0.1	150	45	14	1	1	1	4	2.4515	1	0	1	-0.50079	0.785743	-0.43401	1.125301
999	2	6	0.1	1	0.01	50	5	4	1	1	1	4	28.3069	0.6852	0.0021	0.7655	0.164636	-0.06542	-0.34064	0.550464
1000	-2	6	0.1	1	0.01	150	45	4	9	1	1	4	2.1232	0.8951	0.0007	0.9676	-0.50924	0.502113	-0.40288	1.045878
1001	-2	6	0.1	1	0.1	150	5	4	1	1	1	4	1.3318	1	0	1	-0.52961	0.785743	-0.43401	1.125301
1002	2	6	0.01	6	0.01	150	5	4	9	1	1	4	118.5504	0.9077	0.0037	0.6381	2.487191	0.536181	-0.2695	0.238165
1003	2	14	0.01	1	0.01	150	5	14	9	1	1	4	1.444	0.9615	0.0514	0.1734	-0.52672	0.681646	1.851389	-0.90097
1004	-2	6	0.01	1	0.1	150	45	14	1	1	1	4	29.5202	0	0	0	0.195862	-1.91807	-0.43401	-1.32603
1005	-2	14	0.01	1	0.01	150	45	4	9	1	1	4	3.5918	0.1192	0	1	-0.47145	-1.59578	-0.43401	1.125301
1006	-2	6	0.01	6	0.1	150	45	4	9	1	1	4	4.1838	0.8528	0.0023	0.7351	-0.45621	0.387741	-0.33174	0.475944
1007	2	6	0.01	1	0.01	50	5	14	9	1	1	4	2.0859	0.9631	0.0017	0.9368	-0.5102	0.685972	-0.35842	0.970377
1008	-2	6	0.1	6	0.1	150	45	14	9	1	1	4	2.5425	0.6601	0.0012	0.8347	-0.49845	-0.13328	-0.38065	0.720096
1009	-2	14	0.1	1	0.01	50	5	4	1	1	1	4	7.9121	0	0.0004	0	-0.36026	-1.91807	-0.41622	-1.32603
1010	-2	6	0.1	6	0.01	150	45	4	1	1	1	4	3.1911	1	0.0038	0	-0.48176	0.785743	-0.26505	-1.32603
1011	2	14	0.1	1	0.01	50	45	4	9	1	1	4	2.6517	0.9889	0.0573	0.3928	-0.49564	0.75573	2.11372	-0.36315
1012	-2	14	0.1	6	0.01	50	45	14	9	1	1	4	1.6204	0.9837	0.0233	0.5684	-0.52218	0.741671	0.601979	0.067308
1013	-2	14	0.1	6	0.1	50	5	14	1	1	1	4	5.5633	0.8571	0.005	0.4726	-0.42071	0.399368	-0.21169	-0.16753
1014	2	6	0.01	1	0.01	50	45	14	1	1	1	4	3.0367	1	0	1	-0.48573	0.785743	-0.43401	1.125301
1015	2	6	0.1	6	0.1	150	45	4	1	1	1	4	4.033	0.8505	0.0002	0.992	-0.46009	0.381522	-0.42512	1.10569
1016	-2	14	0.1	6	0.01	150	5	14	9	1	1	4	2.7324	0.8144	0.0137	0.2455	-0.49356	0.283915	0.175135	-0.72423
1017	-2	14	0.01	1	0.1	50	45	14	9	1	1	4	1.81	1	0	1	-0.5173	0.785743	-0.43401	1.125301
1018	-2	14	0.01	6	0.01	50	5	4	9	1	1	4	1.288	1	0	1	-0.53074	0.785743	-0.43401	1.125301
1019	2	14	0.1	6	0.1	50	45	4	1	1	1	4	2.1729	0.9452	0.0017	0.9337	-0.50796	0.637574	-0.35842	0.962778
1020	-2	6	0.01	6	0.1	50	45	14	1	1	1	4	3.9033	0.4174	0	1	-0.46343	-0.7895	-0.43401	1.125301
1021	-2	6	0.1	1	0.1	50	45	4	1	1	1	4	6.8172	0.9051	0.0017	0.9524	-0.38843	0.529151	-0.35842	1.008617
1022	2	14	0.1	6	0.01	50	5	14	1	1	1	4	3.6274	0.6218	0.0019	0.5759	-0.47053	-0.23684	-0.34953	0.085693
1023	-2	6	0.01	1	0.01	50	5	4	1	1	1	4	1.1688	1	0	1	-0.5338	0.785743	-0.43401	1.125301
1024	-2	6	0.1	6	0.1	50	5	4	9	1	1	4	2.3418	0.782	0.0131	0.3281	-0.50362	0.196311	0.148457	-0.52175
1025	2	14	0.1	1	0.01	150	45	14	1	1	1	4	5.3538	0.7297	0.0004	0.9247	-0.4261	0.054901	-0.41622	0.940716
1026	2	14	0.01	1	0.1	50	5	14	1	1	1	4	9.8879	0	0	0	-0.30941	-1.91807	-0.43401	-1.32603
1027	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	4	150.3153	0	0	0	3.30471	-1.91807	-0.43401	-1.32603
1028	2	10	0.055	3.5	0.055	100	25	9	5	1	1	4	1.924	1	0	1	-0.51437	0.785743	-0.43401	1.125301
1029	0	6	0.055	3.5	0.055	100	25	9	5	1	1	4	34.0183	0	0	0	0.311628	-1.91807	-0.43401	-1.32603
1030	0	14	0.055	3.5	0.055	100	25	9	5	1	1	4	7.3126	0	0.0011	0	-0.37568	-1.91807	-0.3851	-1.32603
1031	0	10	0.01	3.5	0.055	100	25	9	5	1	1	4	7.2571	0	0	0	-0.37711	-1.91807	-0.43401	-1.32603
1032	0	10	0.1	3.5	0.055	100	25	9	5	1	1	4	2.0772	1	0.0015	0	-0.51043	0.785743	-0.36731	-1.32603
1033	0	10	0.055	1	0.055	100	25	9	5	1	1	4	67.8157	0.9261	0.0505	0.0955	1.181456	0.585931	1.811372	-1.09192
1034	0	10	0.055	6	0.055	100	25	9	5	1	1	4	26.3858	0.863	0.0044	0.6396	0.115194	0.41532	-0.23837	0.241842
1035	0	10	0.055	3.5	0.01	100	25	9	5	1	1	4	24.648	1	0	1	0.070469	0.785743	-0.43401	1.125301
1036	0	10	0.055	3.5	0.1	100	25	9	5	1	1	4	5.4707	0.7892	0.0002	0.9542	-0.42309	0.215778	-0.42512	1.01303
1037	0	10	0.055	3.5	0.055	50	25	9	5	1	1	4	2.5984	0.9927	0.0226	0.5824	-0.49701	0.766005	0.570855	0.101626
1038	0	10	0.055	3.5	0.055	150	25	9	5	1	1	4	2.7262	0.9064	0.0007	0.9699	-0.49372	0.532666	-0.40288	1.051516
1039	0	10	0.055	3.5	0.055	100	5	9	5	1	1	4	1.9812	0.8194	0.0043	0.6277	-0.5129	0.297434	-0.24282	0.212672
1040	0	10	0.055	3.5	0.055	100	45	9	5	1	1	4	119.0997	0.911	0.0089	0.4229	2.501328	0.545103	-0.03829	-0.28936
1041	0	10	0.055	3.5	0.055	100	25	4	5	1	1	4	1.6087	0.8194	0.0041	0.6413	-0.52248	0.297434	-0.25171	0.24601
1042	0	10	0.055	3.5	0.055	100	25	14	5	1	1	4	2.413	0.9927	0.0226	0.5824	-0.50178	0.766005	0.570855	0.101626
1043	0	10	0.055	3.5	0.055	100	25	9	1	1	1	4	28.3409	0.7414	0.0025	0.7588	0.165511	0.086536	-0.32285	0.534041
1044	0	10	0.055	3.5	0.055	100	25	9	9	1	1	4	1.768	0.8839	0.0058	0.5931	-0.51838	0.47183	-0.17612	0.127856
1045	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	2.6384	0.9563	0.0896	0.1075	-0.49598	0.667586	3.549874	-1.06251
1046	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	3.8913	0.4479	0	0.9978	-0.46374	-0.70703	-0.43401	1.119908
1047	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	6.2749	0	0	0	-0.40239	-1.91807	-0.43401	-1.32603
1048	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	3.0852	1	0.0062	0	-0.48448	0.785743	-0.15834	-1.32603
1049	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	5.9534	0.8385	0.002	0.6853	-0.41067	0.349077	-0.34508	0.353868
1050	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	26.4887	0.8649	0.0076	0.51	0.117842	0.420457	-0.09609	-0.07585
1051	2	6	0.01	6	0.1	50	5	4	1	0	1	4	21.4159	0	0	0	-0.01271	-1.91807	-0.43401	-1.32603

1052	2	6	0.1	1	0.1	50	45	14	9	0	1	4	100.054	0.965	0.0428	0.1508	2.011158	0.691109	1.469007	-0.95637
1053	2	14	0.01	6	0.1	50	5	14	9	0	1	4	7.3269	1	0	1	-0.37532	0.785743	-0.43401	1.125301
1054	2	14	0.1	1	0.1	150	45	4	9	0	1	4	4.4199	1	0.0554	0	-0.45013	0.785743	2.029241	-1.32603
1055	2	14	0.01	1	0.1	50	5	4	9	0	1	4	2.7389	0.6078	0.0059	0.7897	-0.4934	-0.27469	-0.17168	0.609787
1056	-2	6	0.01	1	0.1	150	5	14	9	0	1	4	1.3931	1	0	1	-0.52803	0.785743	-0.43401	1.125301
1057	2	6	0.1	6	0.1	150	5	14	9	0	1	4	5.8905	0	0.0002	0	-0.41228	-1.91807	-0.42512	-1.32603
1058	2	14	0.1	6	0.1	150	5	4	1	0	1	4	68.0258	0	0	0	1.186863	-1.91807	-0.43401	-1.32603
1059	2	6	0.01	6	0.01	50	45	4	9	0	1	4	3.5185	0.9892	0.0439	0.4361	-0.47333	0.756542	1.517916	-0.257
1060	2	6	0.01	6	0.01	150	5	14	1	0	1	4	117.4967	0.974	0.0131	0.4779	2.460073	0.715444	0.148457	-0.15454
1061	-2	14	0.01	1	0.1	150	5	4	1	0	1	4	124.847	0.9526	0.0008	0.9116	2.649244	0.657582	-0.39844	0.908603
1062	-2	6	0.1	1	0.01	50	5	14	1	0	1	4	1.9843	1	0	1	-0.51282	0.785743	-0.43401	1.125301
1063	-2	14	0.1	1	0.1	50	5	14	9	0	1	4	2.2533	0.7821	0.0039	0.6595	-0.50589	0.196581	-0.2606	0.290624
1064	2	14	0.1	6	0.01	150	45	4	9	0	1	4	2.274	0.9558	0.0655	0.1401	-0.50536	0.666234	2.478317	-0.9826
1065	-2	6	0.01	6	0.01	150	45	14	9	0	1	4	1.2196	1	0	1	-0.5325	0.785743	-0.43401	1.125301
1066	2	14	0.01	1	0.01	150	45	4	1	0	1	4	65.3503	0	0	0	1.118005	-1.91807	-0.43401	-1.32603
1067	-2	14	0.01	6	0.01	150	45	14	1	0	1	4	4.4101	1	0.0205	0	-0.45038	0.785743	0.477483	-1.32603
1068	2	14	0.01	6	0.1	150	45	14	1	0	1	4	4.5843	0.9428	0.0017	0.9539	-0.4459	0.631085	-0.35842	1.012294
1069	2	6	0.1	1	0.01	50	5	4	1	0	1	4	4.7643	0.9428	0.0015	0.96	-0.44127	0.631085	-0.36731	1.027248
1070	-2	6	0.1	1	0.01	150	45	4	9	0	1	4	3.1691	0.8432	0.0002	0.9927	-0.48232	0.361785	-0.42512	1.107406
1071	-2	6	0.1	1	0.1	150	5	4	1	0	1	4	1.4404	1	0	1	-0.52681	0.785743	-0.43401	1.125301
1072	2	6	0.01	6	0.01	150	5	4	9	0	1	4	3.2007	1	0	1	-0.48151	0.785743	-0.43401	1.125301
1073	2	14	0.01	1	0.01	150	5	14	9	0	1	4	2.3798	0.9835	0.0193	0.6102	-0.50264	0.74113	0.424127	0.169773
1074	-2	6	0.01	1	0.1	150	45	14	1	0	1	4	4.5694	0.4953	0	1	-0.44629	-0.57887	-0.43401	1.125301
1075	-2	14	0.01	1	0.01	150	45	4	9	0	1	4	3.8137	0.6066	0.0065	0.3938	-0.46573	-0.27794	-0.145	-0.36069
1076	-2	6	0.01	6	0.1	150	45	4	9	0	1	4	3.7716	0.9074	0.0007	0.9826	-0.46682	0.535369	-0.40288	1.082648
1077	2	6	0.01	1	0.01	50	5	14	9	0	1	4	4.8522	0	0	0	-0.43901	-1.91807	-0.43401	-1.32603
1078	-2	6	0.1	6	0.1	150	45	14	9	0	1	4	2.4462	0.7971	0.0052	0.567	-0.50093	0.237139	-0.2028	0.063876
1079	-2	14	0.1	1	0.01	50	5	4	1	0	1	4	5.1874	0.9581	0.0003	0.9928	-0.43038	0.672453	-0.42067	1.107651
1080	-2	6	0.1	6	0.01	150	45	4	1	0	1	4	4.0834	1	0.0072	0	-0.45879	0.785743	-0.11387	-1.32603
1081	2	14	0.1	1	0.01	50	45	4	9	0	1	4	21.1603	0	0	0	-0.01929	-1.91807	-0.43401	-1.32603
1082	-2	14	0.1	6	0.01	50	45	14	9	0	1	4	119.1256	0.911	0.0089	0.4234	2.501995	0.545103	-0.03829	-0.28813
1083	-2	14	0.1	6	0.1	50	5	14	1	0	1	4	114.0559	0.8906	0.0045	0.5825	2.371518	0.489945	-0.23392	0.101872
1084	2	6	0.01	1	0.01	50	45	14	1	0	1	4	2.1573	0.9384	0.0009	0.9628	-0.50836	0.619188	-0.39399	1.034111
1085	2	6	0.1	6	0.1	150	45	4	1	0	1	4	2.3133	0.7971	0.0085	0.4435	-0.50435	0.237139	-0.05607	-0.23886
1086	-2	14	0.1	6	0.01	150	5	14	9	0	1	4	98.8298	0.8838	0.0052	0.5392	1.979651	0.471559	-0.2028	-0.00427
1087	-2	14	0.01	1	0.1	50	45	14	9	0	1	4	3.854	0.6824	0.0015	0.808	-0.4647	-0.07299	-0.36731	0.654646
1088	-2	14	0.01	6	0.01	50	5	4	9	0	1	4	1.306	1	0	1	-0.53027	0.785743	-0.43401	1.125301
1089	2	14	0.1	6	0.1	50	45	4	1	0	1	4	8.6753	0	0	0	-0.34061	-1.91807	-0.43401	-1.32603
1090	-2	6	0.01	6	0.1	50	45	14	1	0	1	4	2.9577	0.9924	0.0478	0.4571	-0.48776	0.765194	1.691322	-0.20552
1091	-2	6	0.1	1	0.1	50	45	4	1	0	1	4	3.9049	0.8825	0.0018	0.9483	-0.46339	0.468044	-0.35397	0.998567
1092	2	14	0.1	6	0.01	50	5	14	1	0	1	4	114.6884	0.9711	0.0586	0.1277	2.387797	0.707603	2.171522	-1.01299
1093	-2	6	0.01	1	0.01	50	5	4	1	0	1	4	1.4512	1	0	1	-0.52654	0.785743	-0.43401	1.125301
1094	-2	6	0.1	6	0.1	50	5	4	9	0	1	4	9.1952	0	0	0	-0.32723	-1.91807	-0.43401	-1.32603
1095	2	14	0.1	1	0.01	150	45	14	1	0	1	4	97.0446	0.9382	0.0001	0.9831	1.933706	0.618647	-0.42956	1.083873
1096	2	14	0.01	1	0.1	50	5	14	1	0	1	4	119.0823	0.9107	0.0091	0.4163	2.50088	0.544292	-0.0294	-0.30554
1097	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	4	119.8552	0	0	0	2.520772	-1.91807	-0.43401	-1.32603
1098	2	10	0.055	3.5	0.055	100	25	9	5	0	1	4	3.0994	1	0	1	-0.48412	0.785743	-0.43401	1.125301
1099	0	6	0.055	3.5	0.055	100	25	9	5	0	1	4	2.8862	1	0	1	-0.4896	0.785743	-0.43401	1.125301
1100	0	14	0.055	3.5	0.055	100	25	9	5	0	1	4	2.1691	0.9538	0.0544	0.1574	-0.50806	0.660827	1.984778	-0.94019
1101	0	10	0.01	3.5	0.055	100	25	9	5	0	1	4	2.6654	0.9818	0.0166	0.6421	-0.49529	0.736533	0.304077	0.247971
1102	0	10	0.1	3.5	0.055	100	25	9	5	0	1	4	3.106	0.4174	0	1	-0.48395	-0.7895	-0.43401	1.125301
1103	0	10	0.055	1	0.055	100	25	9	5	0	1	4	3.9978	0.8105	0.0026	0.5759	-0.461	0.27337	-0.3184	0.085693
1104	0	10	0.055	6	0.055	100	25	9	5	0	1	4	4.4438	0.78	0.012	0.7443	-0.44952	0.190903	0.099547	0.498496
1105	0	10	0.055	3.5	0.01	100	25	9	5	0	1	4	3.0503	0.6283	0.0178	0.2941	-0.48538	-0.21927	0.357433	-0.60509
1106	0	10	0.055	3.5	0.1	100	25	9	5	0	1	4	6.8556	1	0	1	-0.38745	0.785743	-0.43401	1.125301
1107	0	10	0.055	3.5	0.055	50	25	9	5	0	1	4	1.8505	0.9415	0.0013	0.9482	-0.51626	0.62757	-0.37621	0.998322
1108	0	10	0.055	3.5	0.055	150	25	9	5	0	1	4	79.3828	0	0	0	1.479153	-1.91807	-0.43401	-1.32603
1109	0	10	0.055	3.5	0.055	100	5	9	5	0	1	4	1.9895	0.9595	0.0625	0.1407	-0.51268	0.676238	2.344928	-0.98112
1110	0	10	0.055	3.5	0.055	100	45	9	5	0	1	4	156.9635	0	0	0	3.475811	-1.91807	-0.43401	-1.32603
1111	0	10	0.055	3.5	0.055	100	25	4	5	0	1	4	2.6318	0.9986	0.033	0.5083	-0.49615	0.781957	1.03327	-0.08002
1112	0	10	0.055	3.5	0.055	100	25	14	5	0	1	4	1.4786	1	0	1	-0.52583	0.785743	-0.43401	1.125301
1113	0	10	0.055	3.5	0.055	100	25	9	1	0	1	4	79.4692	0.9503	0.0844	0.0625	1.481376	0.651363	3.318667	-1.17282
1114	0	10	0.055	3.5	0.055	100	25	9	9	0	1	4	4.1831	0	0.0165	0	-0.45623	-1.91807	0.299631	-1.32603
1115	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	1.8567	1	0	1	-0.5161	0.785743	-0.43401	1.125301
1116	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	34.6455	0	0	0	0.32777	-1.91807	-0.43401	-1.32603
1117	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	64.4675	0.9337	0.1593	0.0336	1.095285	0.60648	6.648944	-1.24366
1118	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	130.2815	0	0	0	2.789109	-1.91807	-0.43401	-1.32603
1119	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	2.8822	0.7767	0.0691	0.1251	-0.48971	0.181981	2.638383	-1.01937
1120	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	2.0937	0.8295	0.0148	0.2441	-0.51	0.324742	0.224044	-0.72766

Table A.4 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 4) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 5)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
1121	2	6	0.01	6	0.1	50	5	4	1	1	0	5	3.9219	0.6218	0.002	0.5585	-0.46295	-0.23684	-0.34508	0.04304
1122	2	6	0.1	1	0.1	50	45	14	9	1	0	5	1.7126	1	0	1	-0.51981	0.785743	-0.43401	1.125301
1123	2	14	0.01	6	0.1	50	5	14	9	1	0	5	5.5819	0	0	0	-0.42023	-1.91807	-0.43401	-1.32603
1124	2	14	0.1	1	0.1	150	45	4	9	1	0	5	4.0001	1	0	1	-0.46094	0.785743	-0.43401	1.125301
1125	2	14	0.01	1	0.1	50	5	4	9	1	0	5	113.6599	0	0	0	2.361327	-1.91807	-0.43401	-1.32603
1126	-2	6	0.01	1	0.1	150	5	14	9	1	0	5	3.2772	0	0	0	-0.47954	-1.91807	-0.43401	-1.32603
1127	2	6	0.1	6	0.1	150	5	14	9	1	0	5	12.4979	0	0	0	-0.24223	-1.91807	-0.43401	-1.32603
1128	2	14	0.1	6	0.1	150	5	4	1	1	0	5	118.9498	0	0	0	2.49747	-1.91807	-0.43401	-1.32603
1129	2	6	0.01	6	0.01	50	45	4	9	1	0	5	6.8325	0.4142	0.0008	0.9474	-0.38804	-0.79815	-0.39844	0.996361
1130	2	6	0.01	6	0.01	150	5	14	1	1	0	5	6.0578	0.5191	0.0014	0.61	-0.40798	-0.51452	-0.37176	0.169283
1131	-2	14	0.01	1	0.1	150	5	4	1	1	0	5	2.6431	0.8281	0.0038	0.612	-0.49586	0.320957	-0.26505	0.174186
1132	-2	6	0.1	1	0.01	50	5	14	1	1	0	5	3.0092	1	0	1	-0.48644	0.785743	-0.43401	1.125301
1133	-2	14	0.1	1	0.1	50	5	14	9	1	0	5	6.3506	0.7792	0.0129	0.7305	-0.40044	0.18874	0.139564	0.464668
1134	2	14	0.1	6	0.01	150	45	4	9	1	0	5	2.2043	0.9415	0.0012	0.9516	-0.50715	0.62757	-0.38065	1.006656
1135	-2	6	0.01	6	0.01	150	45	14	9	1	0	5	90.9647	0.9711	0.0566	0.122	1.777231	0.707603	2.082596	-1.02696
1136	2	14	0.01	1	0.01	150	45	4	1	1	0	5	65.4847	0	0	0	1.121464	-1.91807	-0.43401	-1.32603
1137	-2	14	0.01	6	0.01	150	45	14	1	1	0	5	3.0239	0.9857	0.0196	0.6194	-0.48606	0.747078	0.437466	0.192326
1138	2	14	0.01	6	0.1	150	45	14	1	1	0	5	4.1034	0.4847	0.0004	0.8681	-0.45828	-0.60753	-0.41622	0.801971
1139	2	6	0.1	1	0.01	50	5	4	1	1	0	5	8.1723	0	0	0	-0.35356	-1.91807	-0.43401	-1.32603
1140	-2	6	0.1	1	0.01	150	45	4	9	1	0	5	64.2518	0.8153	0.0044	0.4885	1.089733	0.286348	-0.23837	-0.12855
1141	-2	6	0.1	1	0.1	150	5	4	1	1	0	5	2.9749	0.4199	0.0009	0.9416	-0.48732	-0.78274	-0.39399	0.982143
1142	2	6	0.01	6	0.01	150	5	4	9	1	0	5	2.8322	1	0	1	-0.49099	0.785743	-0.43401	1.125301
1143	2	14	0.01	1	0.01	150	5	14	9	1	0	5	65.6207	0.9579	0.1516	0.0378	1.124964	0.671912	6.306579	-1.23337
1144	-2	6	0.01	1	0.1	150	45	14	1	1	0	5	2.3507	0.9928	0.031	0.5073	-0.50339	0.766275	0.944344	-0.08247
1145	-2	14	0.01	1	0.01	150	45	4	9	1	0	5	4.1475	0.9206	0.0011	0.9696	-0.45714	0.57106	-0.3851	1.05078
1146	-2	6	0.01	6	0.1	150	45	4	9	1	0	5	1.9556	0.8854	0.0086	0.5	-0.51356	0.475886	-0.05163	-0.10036
1147	2	6	0.01	1	0.01	50	5	14	9	1	0	5	5.3728	0.682	0.005	0.4901	-0.42561	-0.07407	-0.21169	-0.12463
1148	-2	6	0.1	6	0.1	150	45	14	9	1	0	5	2.8588	1	0.0015	0	-0.49031	0.785743	-0.36731	-1.32603
1149	-2	14	0.1	1	0.01	50	5	4	1	1	0	5	27.5488	0.8758	0.013	0.3873	0.145125	0.449929	0.14401	-0.37663
1150	-2	6	0.1	6	0.01	150	45	4	1	1	0	5	3.4235	0.8509	0.0041	0.5249	-0.47578	0.382604	-0.25171	-0.03932
1151	2	14	0.1	1	0.01	50	45	4	9	1	0	5	3.6509	0.5932	0	1	-0.46992	-0.31417	-0.43401	1.125301
1152	-2	14	0.1	6	0.01	50	45	14	9	1	0	5	1.2034	1	0	1	-0.53291	0.785743	-0.43401	1.125301
1153	-2	14	0.1	6	0.1	50	5	14	1	1	0	5	6.0738	0	0	0	-0.40757	-1.91807	-0.43401	-1.32603
1154	2	6	0.01	1	0.01	50	45	14	1	1	0	5	18.3003	0	0	0	-0.0929	-1.91807	-0.43401	-1.32603
1155	2	6	0.1	6	0.1	150	45	4	1	1	0	5	1.3944	1	0	1	-0.528	0.785743	-0.43401	1.125301
1156	-2	14	0.1	6	0.01	150	5	14	9	1	0	5	7.7444	0.9428	0.0013	0.9652	-0.36457	0.631085	-0.37621	1.039994
1157	-2	14	0.01	1	0.1	50	45	14	9	1	0	5	4.7741	0.8368	0.0022	0.7067	-0.44102	0.34448	-0.33619	0.406326
1158	-2	14	0.01	6	0.01	50	5	4	9	1	0	5	6.0885	0.8079	0.0005	0.9051	-0.40719	0.26634	-0.41178	0.89267
1159	2	14	0.1	6	0.1	50	45	4	1	1	0	5	1.6914	1	0.0015	0	-0.52035	0.785743	-0.36731	-1.32603
1160	-2	6	0.01	6	0.1	50	45	14	1	1	0	5	4.0797	0	0.0019	0	-0.45889	-1.91807	-0.34953	-1.32603
1161	-2	6	0.1	1	0.1	50	45	4	1	1	0	5	3.069	0.75	0.0018	0.6647	-0.4849	0.109789	-0.35397	0.303371
1162	2	14	0.1	6	0.01	50	5	14	1	1	0	5	65.197	0.954	0.0788	0.0645	1.114059	0.661367	3.069674	-1.16792
1163	-2	6	0.01	1	0.01	50	5	4	1	1	0	5	2.9437	0.6351	0.0011	0.7402	-0.48812	-0.20088	-0.3851	0.488446
1164	-2	6	0.1	6	0.1	50	5	4	9	1	0	5	1.6278	0.9505	0.0012	0.9522	-0.52199	0.651904	-0.38065	1.008127
1165	2	14	0.1	1	0.01	150	45	14	1	1	0	5	99.773	0.966	0.1035	0.0704	2.003926	0.693813	4.16791	-1.15345
1166	2	14	0.01	1	0.1	50	5	14	1	1	0	5	6.3367	0.3362	0.0028	0.3278	-0.4008	-1.00905	-0.30951	-0.52248
1167	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	5	3.9025	0.6218	0.0017	0.6016	-0.46345	-0.23684	-0.35842	0.148692
1168	2	10	0.055	3.5	0.055	100	25	9	5	1	0	5	2.3871	1	0.0541	0	-0.50245	0.785743	1.971439	-1.32603
1169	0	6	0.055	3.5	0.055	100	25	9	5	1	0	5	20.7215	1	0	1	-0.03059	0.785743	-0.43401	1.125301
1170	0	14	0.055	3.5	0.055	100	25	9	5	1	0	5	2.4	1	0	1	-0.50212	0.785743	-0.43401	1.125301
1171	0	10	0.01	3.5	0.055	100	25	9	5	1	0	5	4.125	0.9428	0.0017	0.9539	-0.45772	0.631085	-0.35842	1.012294
1172	0	10	0.1	3.5	0.055	100	25	9	5	1	0	5	77.0674	0.918	0.0443	0.1103	1.419562	0.56403	1.535702	-1.05565
1173	0	10	0.055	1	0.055	100	25	9	5	1	0	5	2.426	0.5628	0.005	0.8045	-0.50145	-0.39637	-0.21169	0.646066
1174	0	10	0.055	6	0.055	100	25	9	5	1	0	5	7.4101	1	0	1	-0.37318	0.785743	-0.43401	1.125301
1175	0	10	0.055	3.5	0.01	100	25	9	5	1	0	5	3.5792	1	0	1	-0.47177	0.785743	-0.43401	1.125301
1176	0	10	0.055	3.5	0.1	100	25	9	5	1	0	5	2.1946	1	0	1	-0.5074	0.785743	-0.43401	1.125301
1177	0	10	0.055	3.5	0.055	50	25	9	5	1	0	5	1.7267	1	0	1	-0.51945	0.785743	-0.43401	1.125301
1178	0	10	0.055	3.5	0.055	150	25	9	5	1	0	5	1.7626	0.9681	0.0891	0.1119	-0.51852	0.699491	3.527643	-1.05172
1179	0	10	0.055	3.5	0.055	100	5	9	5	1	0	5	122.834	0.9637	0.0007	0.93	2.597436	0.687594	-0.40288	0.953708
1180	0	10	0.055	3.5	0.055	100	45	9	5	1	0	5	4.6935	0	0	0	-0.44309	-1.91807	-0.43401	-1.32603
1181	0	10	0.055	3.5	0.055	100	25	4	5	1	0	5	2.1869	1	0	1	-0.5076	0.785743	-0.43401	1.125301
1182	0	10	0.055	3.5	0.055	100	25	14	5	1	0	5	3.601	0.1578	0	1	-0.47121	-1.49141	-0.43401	1.125301
1183	0	10	0.055	3.5	0.055	100	25	9	1	1	0	5	2.4475	0.9561	0.0056	0.8669	-0.5009	0.667045	-0.18502	0.799029
1184	0	10	0.055	3.5	0.055	100	25	9	9	1	0	5	2.3741	0.9598	0.0263	0.5921	-0.50278	0.677049	0.735368	0.125404
1185	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	2.4704	1	0.0075	0	-0.50031	0.785743	-0.10054	-1.32603

1186	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	3.754	0.6667	0.0225	0.2626	-0.46727	-0.11544	0.566409	-0.68231
1187	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	1.6617	0.8194	0.0041	0.6413	-0.52112	0.297434	-0.25171	0.24601
1188	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	1.3998	1	0	1	-0.52786	0.785743	-0.43401	1.125301
1189	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	86.5637	0	0	0	1.663964	-1.91807	-0.43401	-1.32603
1190	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	3.2714	0.8439	0.0001	0.9964	-0.47969	0.363677	-0.42956	1.116476
1191	2	6	0.01	6	0.1	50	5	4	1	0	0	5	3.878	0	0	0	-0.46408	-1.91807	-0.43401	-1.32603
1192	2	6	0.1	1	0.1	50	45	14	9	0	0	5	3.0603	0.9209	0.0002	0.9932	-0.48512	0.571871	-0.42512	1.108632
1193	2	14	0.01	6	0.1	50	5	14	9	0	0	5	101.8905	0.8934	0.0007	0.9033	2.058423	0.497516	-0.40288	0.888257
1194	2	14	0.1	1	0.1	150	45	4	9	0	0	5	3.9015	0.9664	0.0075	0.8313	-0.46347	0.694895	-0.10054	0.711762
1195	2	14	0.01	1	0.1	50	5	4	9	0	0	5	27.8646	0.7554	0.005	0.6318	0.153253	0.12439	-0.21169	0.222722
1196	-2	6	0.01	1	0.1	150	5	14	9	0	0	5	26.4906	0.8639	0.0073	0.5163	0.117891	0.417753	-0.10943	-0.06041
1197	2	6	0.1	6	0.1	150	5	14	9	0	0	5	34.6646	1	0.0057	0	0.328261	0.785743	-0.18057	-1.32603
1198	2	14	0.1	6	0.1	150	5	4	1	0	0	5	13.0627	0	0	0	-0.2277	-1.91807	-0.43401	-1.32603
1199	2	6	0.01	6	0.01	50	45	4	9	0	0	5	1.2192	1	0	1	-0.53251	0.785743	-0.43401	1.125301
1200	2	6	0.01	6	0.01	150	5	14	1	0	0	5	8.7076	0	0	0	-0.33978	-1.91807	-0.43401	-1.32603
1201	-2	14	0.01	1	0.1	150	5	4	1	0	0	5	1.973	0.9548	0.0824	0.1123	-0.51311	0.66353	3.229741	-1.05074
1202	-2	6	0.1	1	0.01	50	5	14	1	0	0	5	1.563	1	0	1	-0.52366	0.785743	-0.43401	1.125301
1203	-2	14	0.1	1	0.1	50	5	14	9	0	0	5	119.5665	0	0	0	2.513342	-1.91807	-0.43401	-1.32603
1204	2	14	0.1	6	0.01	150	45	4	9	0	0	5	4.84	0	0.0019	0	-0.43932	-1.91807	-0.34953	-1.32603
1205	-2	6	0.01	6	0.01	150	45	14	9	0	0	5	4.0729	1	0.0029	0	-0.45906	0.785743	-0.30507	-1.32603
1206	2	14	0.01	1	0.01	150	45	4	1	0	0	5	2.8226	0.7661	0.001	0.8086	-0.49124	0.15332	-0.38955	0.656117
1207	-2	14	0.01	6	0.01	150	45	14	1	0	0	5	3.3384	0	0	0	-0.47797	-1.91807	-0.43401	-1.32603
1208	2	14	0.01	6	0.1	150	45	14	1	0	0	5	4.6187	0.7892	0.0003	0.9481	-0.44502	0.215778	-0.42067	0.998077
1209	2	6	0.1	1	0.01	50	5	4	1	0	0	5	2.3097	0.7515	0.0008	0.9071	-0.50444	0.113845	-0.39844	0.897572
1210	-2	6	0.1	1	0.01	150	45	4	9	0	0	5	1.9504	1	0	1	-0.51369	0.785743	-0.43401	1.125301
1211	-2	6	0.1	1	0.1	150	5	4	1	0	0	5	1.9797	1	0	1	-0.51293	0.785743	-0.43401	1.125301
1212	2	6	0.01	6	0.01	150	5	4	9	0	0	5	2.6231	1	0	1	-0.49638	0.785743	-0.43401	1.125301
1213	2	14	0.01	1	0.01	150	5	14	9	0	0	5	85.7073	0.8832	0.0018	0.7784	1.641924	0.469937	-0.35397	0.582087
1214	-2	6	0.01	1	0.1	150	45	14	1	0	0	5	2.7874	1	0.0596	0	-0.49215	0.785743	2.215985	-1.32603
1215	-2	14	0.01	1	0.01	150	45	4	9	0	0	5	4.0177	0.8268	0.0289	0.1119	-0.46048	0.317442	0.850972	-1.05172
1216	-2	6	0.01	6	0.1	150	45	4	9	0	0	5	2.3629	0.9574	0.087	0.1131	-0.50307	0.67056	3.434271	-1.04878
1217	2	6	0.01	1	0.01	50	5	14	9	0	0	5	4.261	0.8268	0.0289	0.1119	-0.45422	0.317442	0.850972	-1.05172
1218	-2	6	0.1	6	0.1	150	45	14	9	0	0	5	2.0166	1	0	1	-0.51199	0.785743	-0.43401	1.125301
1219	-2	14	0.1	1	0.01	50	5	4	1	0	0	5	4.4553	0.6128	0.0023	0.5199	-0.44922	-0.26117	-0.33174	-0.05158
1220	-2	6	0.1	6	0.01	150	45	4	1	0	0	5	2.7363	0.6351	0.0012	0.7176	-0.49346	-0.20088	-0.38065	0.433046
1221	2	14	0.1	1	0.01	50	45	4	9	0	0	5	120.4524	0.9541	0.0022	0.819	2.536142	0.661638	-0.33619	0.68161
1222	-2	14	0.1	6	0.01	50	45	14	9	0	0	5	3.4223	1	0	1	-0.47581	0.785743	-0.43401	1.125301
1223	-2	14	0.1	6	0.1	50	5	14	1	0	0	5	2.2845	0.9384	0.0107	0.775	-0.50509	0.619188	0.041746	0.573752
1224	2	6	0.01	1	0.01	50	45	14	1	0	0	5	2.4174	0.8897	0.0006	0.9734	-0.50167	0.487512	-0.40733	1.060095
1225	2	6	0.1	6	0.1	150	45	4	1	0	0	5	2.7612	1	0.0519	0	-0.49282	0.785743	1.87362	-1.32603
1226	-2	14	0.1	6	0.01	150	5	14	9	0	0	5	4.0435	0.9273	0.0155	0.231	-0.45982	0.589175	0.255168	-0.75977
1227	-2	14	0.01	1	0.1	50	45	14	9	0	0	5	26.4977	0.8758	0.0164	0.335	0.118073	0.449929	0.295185	-0.50483
1228	-2	14	0.01	6	0.01	50	5	4	9	0	0	5	6.2383	0.5939	0	1	-0.40333	-0.31228	-0.43401	1.125301
1229	2	14	0.1	6	0.1	50	45	4	1	0	0	5	6.6251	0.3362	0.0028	0.3278	-0.39338	-1.00905	-0.30951	-0.52248
1230	-2	6	0.01	6	0.1	50	45	14	1	0	0	5	1.4997	1	0	1	-0.52529	0.785743	-0.43401	1.125301
1231	-2	6	0.1	1	0.1	50	45	4	1	0	0	5	1.6907	0.8806	0.0219	0.3333	-0.52037	0.462907	0.539731	-0.509
1232	2	14	0.1	6	0.01	50	5	14	1	0	0	5	3.8455	0	0.0174	0	-0.46492	-1.91807	0.339648	-1.32603
1233	-2	6	0.01	1	0.01	50	5	4	1	0	0	5	27.5905	0.8758	0.013	0.3873	0.146198	0.449929	0.14401	-0.37663
1234	-2	6	0.1	6	0.1	50	5	4	9	0	0	5	4.2003	1	0	1	-0.45578	0.785743	-0.43401	1.125301
1235	2	14	0.1	1	0.01	150	45	14	1	0	0	5	4.2172	0.9428	0.0017	0.9539	-0.45535	0.631085	-0.35842	1.012294
1236	2	14	0.01	1	0.1	50	5	14	1	0	0	5	27.5163	0.765	0.007	0.5534	0.144289	0.150346	-0.12277	0.030538
1237	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	5	3.0263	1	0.0072	0	-0.486	0.785743	-0.11387	-1.32603
1238	2	10	0.055	3.5	0.055	100	25	9	5	0	0	5	2.6438	0.9121	0.0007	0.9702	-0.49584	0.548077	-0.40288	1.052251
1239	0	6	0.055	3.5	0.055	100	25	9	5	0	0	5	5.1543	0.9428	0.0017	0.9539	-0.43123	0.631085	-0.35842	1.012294
1240	0	14	0.055	3.5	0.055	100	25	9	5	0	0	5	4.1303	0.6201	0.0057	0.7995	-0.45759	-0.24144	-0.18057	0.63381
1241	0	10	0.01	3.5	0.055	100	25	9	5	0	0	5	2.2743	0.8598	0.0005	0.9787	-0.50535	0.406668	-0.41178	1.073087
1242	0	10	0.1	3.5	0.055	100	25	9	5	0	0	5	17.9684	0	0	0	-0.10144	-1.91807	-0.43401	-1.32603
1243	0	10	0.055	1	0.055	100	25	9	5	0	0	5	2.5953	1	0.0589	0	-0.49709	0.785743	2.184861	-1.32603
1244	0	10	0.055	6	0.055	100	25	9	5	0	0	5	120.826	0	0	0	2.545757	-1.91807	-0.43401	-1.32603
1245	0	10	0.055	3.5	0.01	100	25	9	5	0	0	5	26.4713	0.8649	0.0076	0.51	0.117394	0.420457	-0.09609	-0.07585
1246	0	10	0.055	3.5	0.1	100	25	9	5	0	0	5	1.4142	1	0	1	-0.52749	0.785743	-0.43401	1.125301
1247	0	10	0.055	3.5	0.055	50	25	9	5	0	0	5	119.7124	0.9045	0.0024	0.7266	2.517097	0.527528	-0.3273	0.455108
1248	0	10	0.055	3.5	0.055	150	25	9	5	0	0	5	2.2207	1	0.0799	0.3331	-0.50673	0.785743	3.118584	-0.50949
1249	0	10	0.055	3.5	0.055	100	5	9	5	0	0	5	6.2352	0.1702	0.0012	0.3636	-0.40341	-1.45788	-0.38065	-0.43472
1250	0	10	0.055	3.5	0.055	100	45	9	5	0	0	5	8.8063	0	0	0	-0.33724	-1.91807	-0.43401	-1.32603
1251	0	10	0.055	3.5	0.055	100	25	4	5	0	0	5	1.5192	1	0	1	-0.52479	0.785743	-0.43401	1.125301
1252	0	10	0.055	3.5	0.055	100	25	14	5	0	0	5	107.5381	0.9261	0.0133	0.5344	2.203773	0.585931	0.157349	-0.01604
1253	0	10	0.055	3.5	0.055	100	25	9	1	0	0	5	119.6447	0.9006	0.0037	0.6295	2.515355	0.516984	-0.2695	0.217084
1254	0	10	0.055	3.5	0.055	100	25	9	9	0	0	5	2.0028	1	0	1	-0.51234	0.785743	-0.43401	1.125301
1255	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	4.4192	0.9399	0.0349	0.1389	-0.45015	0.623243	1.11775	-0.98554
1256	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	2.485	0.9904	0.0655	0.3684	-0.49993	0.759786	2.478317	-0.42296
1257	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	2.6416	0.9863	0.0555	0.3981	-0.4959	0.748701	2.033687	-0.35015
1258	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	6.3738	0.2681	0.0011	0.4922	-0.39985	-1.19318	-0.3851	-0.11948

1259	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	1.692	0.9801	0.015	0.6625	-0.52034	0.731937	0.232936	0.297978
1260	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	3.7831	0.8385	0.002	0.6853	-0.46652	0.349077	-0.34508	0.353868
1261	2	6	0.01	6	0.1	50	5	4	1	1	1	5	116.632	0.9491	0.0033	0.7371	2.437818	0.648119	-0.28728	0.480847
1262	2	6	0.1	1	0.1	50	45	14	9	1	1	5	10.0656	0	0	0	-0.30483	-1.91807	-0.43401	-1.32603
1263	2	14	0.01	6	0.1	50	5	14	9	1	1	5	6.2683	0.9609	0.0121	0.2977	-0.40256	0.680024	0.103994	-0.59627
1264	2	14	0.1	1	0.1	150	45	4	9	1	1	5	8.1896	0.9612	0.0035	0.6804	-0.35311	0.680835	-0.27839	0.341857
1265	2	14	0.01	1	0.1	50	5	4	9	1	1	5	60.6386	0.9333	0.0621	0.0813	0.996742	0.605398	2.327143	-1.12673
1266	-2	6	0.01	1	0.1	150	5	14	9	1	1	5	2.8909	1	0.0055	0	-0.48948	0.785743	-0.18946	-1.32603
1267	2	6	0.1	6	0.1	150	5	14	9	1	1	5	2.5228	0.7544	0.0013	0.86	-0.49896	0.121686	-0.37621	0.782115
1268	2	14	0.1	6	0.1	150	5	4	1	1	1	5	105.7633	0.8455	0.0014	0.8325	2.158095	0.368003	-0.37176	0.714703
1269	2	6	0.01	6	0.01	50	45	4	9	1	1	5	2.6132	0.7544	0.006	0.5708	-0.49663	0.121686	-0.16723	0.073191
1270	2	6	0.01	6	0.01	150	5	14	1	1	1	5	1.2956	1	0.0013	0	-0.53054	0.785743	-0.37621	-1.32603
1271	-2	14	0.01	1	0.1	150	5	4	1	1	1	5	2.3952	1	0	1	-0.50224	0.785743	-0.43401	1.125301
1272	-2	6	0.1	1	0.01	50	5	14	1	1	1	5	6.5272	0	0	0	-0.3959	-1.91807	-0.43401	-1.32603
1273	-2	14	0.1	1	0.1	50	5	14	9	1	1	5	27.5423	0.7737	0.006	0.6025	0.144958	0.173869	-0.16723	0.150898
1274	2	14	0.1	6	0.01	150	45	4	9	1	1	5	2.4718	0.8879	0.0005	0.9774	-0.50027	0.482645	-0.41178	1.069901
1275	-2	6	0.01	6	0.01	150	45	14	9	1	1	5	102.0943	0	0	0	2.063668	-1.91807	-0.43401	-1.32603
1276	2	14	0.01	1	0.01	150	45	4	1	1	1	5	1.3083	1	0	1	-0.53021	0.785743	-0.43401	1.125301
1277	-2	14	0.01	6	0.01	150	45	14	1	1	1	5	3.4912	1	0.004	0	-0.47403	0.785743	-0.25616	-1.32603
1278	2	14	0.01	6	0.1	150	45	14	1	1	1	5	1.8434	1	0	1	-0.51644	0.785743	-0.43401	1.125301
1279	2	6	0.1	1	0.01	50	5	4	1	1	1	5	4.4982	0.889	0	1	-0.44812	0.485619	-0.43401	1.125301
1280	-2	6	0.1	1	0.01	150	45	4	9	1	1	5	7.4076	0	0	0	-0.37324	-1.91807	-0.43401	-1.32603
1281	-2	6	0.1	1	0.1	150	5	4	1	1	1	5	1.2992	1	0	1	-0.53045	0.785743	-0.43401	1.125301
1282	2	6	0.01	6	0.01	150	5	4	9	1	1	5	7.886	0.017	0.015	0.0046	-0.36093	-1.87211	0.232936	-1.31475
1283	2	14	0.01	1	0.01	150	5	14	9	1	1	5	4.0327	0.4479	0	0.9978	-0.4601	-0.70703	-0.43401	1.119908
1284	-2	6	0.01	1	0.1	150	45	14	1	1	1	5	119.868	0.905	0.0089	0.4213	2.521102	0.52888	-0.03829	-0.29328
1285	-2	14	0.01	1	0.01	150	45	4	9	1	1	5	7.0538	0.6473	0.0354	0.1183	-0.38235	-0.16789	1.139981	-1.03603
1286	-2	6	0.01	6	0.1	150	45	4	9	1	1	5	5.9333	0.8385	0.002	0.6888	-0.41118	0.349077	-0.34508	0.362448
1287	2	6	0.01	1	0.01	50	5	14	9	1	1	5	2.9182	1	0	1	-0.48878	0.785743	-0.43401	1.125301
1288	-2	6	0.1	6	0.1	150	45	14	9	1	1	5	5.7414	0.8494	0.0025	0.6468	-0.41612	0.378548	-0.32285	0.259492
1289	-2	14	0.1	1	0.01	50	5	4	1	1	1	5	1.3744	1	0	1	-0.52851	0.785743	-0.43401	1.125301
1290	-2	6	0.1	6	0.01	150	45	4	1	1	1	5	3.1087	0.6623	0.0022	0.7391	-0.48388	-0.12734	-0.33619	0.485749
1291	2	14	0.1	1	0.01	50	45	4	9	1	1	5	4.8691	0	0.0012	0	-0.43857	-1.91807	-0.38065	-1.32603
1292	-2	14	0.1	6	0.01	50	45	14	9	1	1	5	2.7207	0.6283	0.0202	0.2679	-0.49386	-0.21927	0.464144	-0.66932
1293	-2	14	0.1	6	0.1	50	5	14	1	1	1	5	119.3635	0.9102	0.0026	0.7119	2.508118	0.54294	-0.3184	0.419073
1294	2	6	0.01	1	0.01	50	45	14	1	1	1	5	2.4288	0.9583	0.1385	0.0758	-0.50138	0.672994	5.724114	-1.14022
1295	2	6	0.1	6	0.1	150	45	4	1	1	1	5	27.9075	0.8232	0.0057	0.5921	0.154357	0.307708	-0.18057	0.125404
1296	-2	14	0.1	6	0.01	150	5	14	9	1	1	5	5.1098	0.6437	0.0001	0.9947	-0.43238	-0.17763	-0.42956	1.112309
1297	-2	14	0.01	1	0.1	50	45	14	9	1	1	5	6.8794	0.8368	0.0023	0.6974	-0.38683	0.34448	-0.33174	0.383529
1298	-2	14	0.01	6	0.01	50	5	4	9	1	1	5	1.464	1	0	1	-0.52621	0.785743	-0.43401	1.125301
1299	2	14	0.1	6	0.1	50	45	4	1	1	1	5	1.2341	1	0	1	-0.53212	0.785743	-0.43401	1.125301
1300	-2	6	0.01	6	0.1	50	45	14	1	1	1	5	2.274	0.7643	0.0039	0.6557	-0.50536	0.148453	-0.2606	0.281309
1301	-2	6	0.1	1	0.1	50	45	4	1	1	1	5	6.5814	0.1234	0.0014	0.2685	-0.3945	-1.58442	-0.37176	-0.66785
1302	2	14	0.1	6	0.01	50	5	14	1	1	1	5	4.0327	0.9846	0.0385	0.5192	-0.4601	0.744104	1.277816	-0.0533
1303	-2	6	0.01	1	0.01	50	5	4	1	1	1	5	3.058	0.6959	0.0011	0.7518	-0.48518	-0.03649	-0.3851	0.516881
1304	-2	6	0.1	6	0.1	50	5	4	9	1	1	5	2.4703	0.9812	0.0005	0.9828	-0.50031	0.734911	-0.41178	1.083138
1305	2	14	0.1	1	0.01	150	45	14	1	1	1	5	3.295	0.6959	0.0011	0.7518	-0.47908	-0.03649	-0.3851	0.516881
1306	2	14	0.01	1	0.1	50	5	14	1	1	1	5	3.5402	1	0.0053	0	-0.47277	0.785743	-0.19835	-1.32603
1307	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	5	3.3537	0.8607	0	0.9981	-0.47757	0.409101	-0.43401	1.120643
1308	2	10	0.055	3.5	0.055	100	25	9	5	1	1	5	2.0251	0.8264	0.006	0.5484	-0.51177	0.31636	-0.16723	0.018281
1309	0	6	0.055	3.5	0.055	100	25	9	5	1	1	5	1.6572	1	0	1	-0.52123	0.785743	-0.43401	1.125301
1310	0	14	0.055	3.5	0.055	100	25	9	5	1	1	5	1.1833	1	0	1	-0.53343	0.785743	-0.43401	1.125301
1311	0	10	0.01	3.5	0.055	100	25	9	5	1	1	5	5.1593	0.8178	0.0216	0.6467	-0.4311	0.293108	0.526392	0.259247
1312	0	10	0.1	3.5	0.055	100	25	9	5	1	1	5	126.6152	0.895	0.0025	0.7761	2.694751	0.501842	-0.32285	0.576449
1313	0	10	0.055	1	0.055	100	25	9	5	1	1	5	5.6274	0.4199	0.0011	0.9346	-0.41906	-0.78274	-0.3851	0.964984
1314	0	10	0.055	6	0.055	100	25	9	5	1	1	5	28.1071	0.6467	0.0099	0.4015	0.159494	-0.16952	0.006175	-0.34182
1315	0	10	0.055	3.5	0.01	100	25	9	5	1	1	5	1.3614	1	0	1	-0.52885	0.785743	-0.43401	1.125301
1316	0	10	0.055	3.5	0.1	100	25	9	5	1	1	5	7.1239	0	0.001	0	-0.38054	-1.91807	-0.38955	-1.32603
1317	0	10	0.055	3.5	0.055	50	25	9	5	1	1	5	98.945	0.8875	0.0014	0.8134	1.982616	0.481564	-0.37176	0.667883
1318	0	10	0.055	3.5	0.055	150	25	9	5	1	1	5	4.0058	0.8587	0.0001	0.9965	-0.46079	0.403694	-0.42956	1.116721
1319	0	10	0.055	3.5	0.055	100	5	9	5	1	1	5	119.1738	0.9104	0.0033	0.6645	2.503235	0.543481	-0.28728	0.30288
1320	0	10	0.055	3.5	0.055	100	45	9	5	1	1	5	2.7815	1	0.051	0	-0.4923	0.785743	1.833604	-1.32603
1321	0	10	0.055	3.5	0.055	100	25	4	5	1	1	5	2.5665	0.9086	0.0007	0.9701	-0.49783	0.538614	-0.40288	1.052006
1322	0	10	0.055	3.5	0.055	100	25	14	5	1	1	5	63.32	0.8065	0.0029	0.5814	1.065752	0.262554	-0.30507	0.099175
1323	0	10	0.055	3.5	0.055	100	25	9	1	1	1	5	5.3273	0	0.0141	0	-0.42678	-1.91807	0.19292	-1.32603
1324	0	10	0.055	3.5	0.055	100	25	9	9	1	1	5	3.6801	0.8483	0.0001	0.9964	-0.46917	0.375574	-0.42956	1.116476
1325	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	3.5652	0.9664	0.0075	0.8313	-0.47213	0.694895	-0.10054	0.711762
1326	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	1.9612	0.8194	0.0041	0.6413	-0.51341	0.297434	-0.25171	0.24601
1327	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	63.7353	0.9034	0.0415	0.1113	1.07644	0.524554	1.411205	-1.05319
1328	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	5.9461	0.017	0.015	0.0046	-0.41085	-1.87211	0.232936	-1.31475
1329	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	25.9841	1	0	1	0.104855	0.785743	-0.43401	1.125301
1330	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	141.3629	0	0	0	3.074306	-1.91807	-0.43401	-1.32603
1331	2	6	0.01	6	0.1	50	5	4	1	0	1	5	5.3611	0.3362	0.0019	0.4202	-0.42591	-1.00905	-0.34953	-0.29598

1332	2	6	0.1	1	0.1	50	45	14	9	0	1	5	4.8149	0.9581	0.0003	0.9928	-0.43997	0.672453	-0.42067	1.107651
1333	2	14	0.01	6	0.1	50	5	14	9	0	1	5	3.8403	0.6218	0.0022	0.5362	-0.46505	-0.23684	-0.33619	-0.01162
1334	2	14	0.1	1	0.1	150	45	4	9	0	1	5	3.7397	1	0	1	-0.46764	0.785743	-0.43401	1.125301
1335	2	14	0.01	1	0.1	50	5	4	9	0	1	5	2.022	0.8264	0.0057	0.5613	-0.51185	0.31636	-0.18057	0.049903
1336	-2	6	0.01	1	0.1	150	5	14	9	0	1	5	4.2188	0	0.0011	0	-0.45531	-1.91807	-0.3851	-1.32603
1337	2	6	0.1	6	0.1	150	5	14	9	0	1	5	119.7087	0.983	0.0066	0.7094	2.517002	0.739778	-0.14055	0.412945
1338	2	14	0.1	6	0.1	150	5	4	1	0	1	5	114.0317	0.8906	0.0045	0.5825	2.370895	0.489945	-0.23392	0.101872
1339	2	6	0.01	6	0.01	50	45	4	9	0	1	5	2.1712	0.9886	0.0304	0.5122	-0.50801	0.754919	0.917666	-0.07046
1340	2	6	0.01	6	0.01	150	5	14	1	0	1	5	1.9111	1	0	1	-0.5147	0.785743	-0.43401	1.125301
1341	-2	14	0.01	1	0.1	150	5	4	1	0	1	5	2.4387	1	0.0505	0	-0.50112	0.785743	1.811372	-1.32603
1342	-2	6	0.1	1	0.01	50	5	14	1	0	1	5	114.1965	0.8906	0.0063	0.4949	2.375137	0.489945	-0.15389	-0.11286
1343	-2	14	0.1	1	0.1	50	5	14	9	0	1	5	2.4166	1	0.0049	0	-0.50169	0.785743	-0.21614	-1.32603
1344	2	14	0.1	6	0.01	150	45	4	9	0	1	5	27.5548	0.7425	0.0052	0.5962	0.14528	0.08951	-0.2028	0.135455
1345	-2	6	0.01	6	0.01	150	45	14	9	0	1	5	125.3346	0.9539	0.0021	0.7972	2.661793	0.661097	-0.34064	0.628172
1346	2	14	0.01	1	0.01	150	45	4	1	0	1	5	3.6147	0.9428	0	1	-0.47086	0.631085	-0.43401	1.125301
1347	-2	14	0.01	6	0.01	150	45	14	1	0	1	5	2.9535	1	0.0055	0	-0.48787	0.785743	-0.18946	-1.32603
1348	2	14	0.01	6	0.1	150	45	14	1	0	1	5	86.9547	0	0	0	1.674027	-1.91807	-0.43401	-1.32603
1349	2	6	0.1	1	0.01	50	5	4	1	0	1	5	5.5752	0.7892	0.0003	0.9481	-0.4204	0.215778	-0.42067	0.998077
1350	-2	6	0.1	1	0.01	150	45	4	9	0	1	5	2.0568	1	0	1	-0.51095	0.785743	-0.43401	1.125301
1351	-2	6	0.1	1	0.1	150	5	4	1	0	1	5	120.083	0.9167	0.0142	0.3153	2.526635	0.560515	0.197366	-0.55312
1352	2	6	0.01	6	0.01	150	5	4	9	0	1	5	1.2303	1	0	1	-0.53222	0.785743	-0.43401	1.125301
1353	2	14	0.01	1	0.01	150	5	14	9	0	1	5	3.9724	0.8826	0.0018	0.9474	-0.46165	0.468315	-0.35397	0.996361
1354	-2	6	0.01	1	0.1	150	45	14	1	0	1	5	2.015	0.9821	0.0183	0.6233	-0.51203	0.737344	0.379664	0.201886
1355	-2	14	0.01	1	0.01	150	45	4	9	0	1	5	1.3719	0.95	0.0759	0.122	-0.52858	0.650552	2.940732	-1.02696
1356	-2	6	0.01	6	0.1	150	45	4	9	0	1	5	2.0131	1	0	1	-0.51208	0.785743	-0.43401	1.125301
1357	2	6	0.01	1	0.01	50	5	14	9	0	1	5	1.9936	1	0	1	-0.51258	0.785743	-0.43401	1.125301
1358	-2	6	0.1	6	0.1	150	45	14	9	0	1	5	12.3763	0	0	0	-0.24536	-1.91807	-0.43401	-1.32603
1359	-2	14	0.1	1	0.01	50	5	4	1	0	1	5	5.3555	0	0	0	-0.42605	-1.91807	-0.43401	-1.32603
1360	-2	6	0.1	6	0.01	150	45	4	1	0	1	5	4.2093	1	0.0503	0	-0.45555	0.785743	1.802479	-1.32603
1361	2	14	0.1	1	0.01	50	45	4	9	0	1	5	3.8629	0	0.0013	0	-0.46447	-1.91807	-0.37621	-1.32603
1362	-2	14	0.1	6	0.01	50	45	14	9	0	1	5	6.2453	0.7892	0.0003	0.9481	-0.40315	0.215778	-0.42067	0.998077
1363	-2	14	0.1	6	0.1	50	5	14	1	0	1	5	2.4946	0.8522	0.0002	0.992	-0.49968	0.386119	-0.42512	1.10569
1364	2	6	0.01	1	0.01	50	45	14	1	0	1	5	68.2091	0.6971	0.0617	0.0819	1.19158	-0.03324	2.309357	-1.12526
1365	2	6	0.1	6	0.1	150	45	4	1	0	1	5	6.0981	0.7742	0.0018	0.7236	-0.40694	0.175221	-0.35397	0.447754
1366	-2	14	0.1	6	0.01	150	5	14	9	0	1	5	2.0406	0.861	0.026	0.2766	-0.51137	0.409912	0.722029	-0.64799
1367	-2	14	0.01	1	0.1	50	45	14	9	0	1	5	1.4333	1	0	1	-0.527	0.785743	-0.43401	1.125301
1368	-2	14	0.01	6	0.01	50	5	4	9	0	1	5	4.4055	0	0	0	-0.4505	-1.91807	-0.43401	-1.32603
1369	2	14	0.1	6	0.1	50	45	4	1	0	1	5	1.2039	1	0	1	-0.5329	0.785743	-0.43401	1.125301
1370	-2	6	0.01	6	0.1	50	45	14	1	0	1	5	2.533	1	0	1	-0.49869	0.785743	-0.43401	1.125301
1371	-2	6	0.1	1	0.1	50	45	4	1	0	1	5	1.469	1	0	1	-0.52608	0.785743	-0.43401	1.125301
1372	2	14	0.1	6	0.01	50	5	14	1	0	1	5	1.8383	1	0	1	-0.51657	0.785743	-0.43401	1.125301
1373	-2	6	0.01	1	0.01	50	5	4	1	0	1	5	3.574	0.5474	0.0037	0.8438	-0.4719	-0.438	-0.2695	0.742403
1374	-2	6	0.1	6	0.1	50	5	4	9	0	1	5	1.6257	1	0	1	-0.52205	0.785743	-0.43401	1.125301
1375	2	14	0.1	1	0.01	150	45	14	1	0	1	5	3.772	1	0	1	-0.46681	0.785743	-0.43401	1.125301
1376	2	14	0.01	1	0.1	50	5	14	1	0	1	5	25.7034	1	0	1	0.097631	0.785743	-0.43401	1.125301
1377	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	5	3.6444	0.6505	0.0563	0.117	-0.47009	-0.15924	2.069257	-1.03922
1378	2	10	0.055	3.5	0.055	100	25	9	5	0	1	5	2.4948	1	0.0589	0	-0.49968	0.785743	2.184861	-1.32603
1379	0	6	0.055	3.5	0.055	100	25	9	5	0	1	5	2.7893	0.4518	0	0.9979	-0.4921	-0.69649	-0.43401	1.120153
1380	0	14	0.055	3.5	0.055	100	25	9	5	0	1	5	2.3894	1	0	1	-0.50239	0.785743	-0.43401	1.125301
1381	0	10	0.01	3.5	0.055	100	25	9	5	0	1	5	4.928	0.9101	0.0114	0.2774	-0.43706	0.54267	0.07287	-0.64603
1382	0	10	0.1	3.5	0.055	100	25	9	5	0	1	5	105.3094	0.9203	0.0006	0.928	2.146414	0.570249	-0.40733	0.948805
1383	0	10	0.055	1	0.055	100	25	9	5	0	1	5	3.0583	0.8825	0.0018	0.9483	-0.48518	0.468044	-0.35397	0.998567
1384	0	10	0.055	6	0.055	100	25	9	5	0	1	5	3.9581	0.5707	0.0026	0.9081	-0.46202	-0.37501	-0.3184	0.900024
1385	0	10	0.055	3.5	0.01	100	25	9	5	0	1	5	69.8599	0.9392	0.0514	0.0976	1.234066	0.621351	1.851389	-1.08678
1386	0	10	0.055	3.5	0.1	100	25	9	5	0	1	5	5.5176	0.1872	0.0019	0.2876	-0.42188	-1.41192	-0.34953	-0.62102
1387	0	10	0.055	3.5	0.055	50	25	9	5	0	1	5	98.485	0.973	0.0135	0.4608	1.970777	0.71274	0.166242	-0.19645
1388	0	10	0.055	3.5	0.055	150	25	9	5	0	1	5	4.3162	0.7892	0.0003	0.9359	-0.4528	0.215778	-0.42067	0.968171
1389	0	10	0.055	3.5	0.055	100	5	9	5	0	1	5	26.568	1	0.0899	0	0.119883	0.785743	3.563213	-1.32603
1390	0	10	0.055	3.5	0.055	100	45	9	5	0	1	5	1.9026	1	0	1	-0.51492	0.785743	-0.43401	1.125301
1391	0	10	0.055	3.5	0.055	100	25	4	5	0	1	5	5.9546	1	0.0001	0	-0.41063	0.785743	-0.42956	-1.32603
1392	0	10	0.055	3.5	0.055	100	25	14	5	0	1	5	4.082	0.8825	0.0018	0.9483	-0.45883	0.468044	-0.35397	0.998567
1393	0	10	0.055	3.5	0.055	100	25	9	1	0	1	5	15.9049	0	0	0	-0.15455	-1.91807	-0.43401	-1.32603
1394	0	10	0.055	3.5	0.055	100	25	9	9	0	1	5	2.2238	1	0	1	-0.50665	0.785743	-0.43401	1.125301
1395	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	27.4147	0.7882	0.0078	0.5575	0.141674	0.213075	-0.0872	0.040588
1396	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	3.493	0.9132	0.0058	0.8934	-0.47399	0.551052	-0.17612	0.863989
1397	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	3.6006	0.8451	0.0003	0.9892	-0.47122	0.366922	-0.42067	1.098826
1398	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	26.4647	0.8742	0.0095	0.4599	0.117224	0.445603	-0.01161	-0.19866
1399	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	2.8874	0.9613	0.0196	0.6547	-0.48957	0.681105	0.437466	0.278857
1400	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	1.2288	1	0	1	-0.53226	0.785743	-0.43401	1.125301

Table A.5 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 5) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 6)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
1401	2	6	0.01	6	0.1	50	5	4	1	1	0	6	5.9092	0	0.0047	0	-0.4118	-1.91807	-0.22503	-1.32603
1402	2	6	0.1	1	0.1	50	45	14	9	1	0	6	5.1741	0	0.0028	0	-0.43072	-1.91807	-0.30951	-1.32603
1403	2	14	0.01	6	0.1	50	5	14	9	1	0	6	3.9575	1	0.0828	0.3261	-0.46203	0.785743	3.247526	-0.52665
1404	2	14	0.1	1	0.1	150	45	4	9	1	0	6	64.9293	0.9294	0.0449	0.1032	1.10717	0.594853	1.562379	-1.07305
1405	2	14	0.01	1	0.1	50	5	4	9	1	0	6	11.8274	0	0	0	-0.25949	-1.91807	-0.43401	-1.32603
1406	-2	6	0.01	1	0.1	150	5	14	9	1	0	6	6.5691	0.8368	0.0023	0.6974	-0.39482	0.34448	-0.33174	0.383529
1407	2	6	0.1	6	0.1	150	5	14	9	1	0	6	3.4947	1	0.0074	0	-0.47394	0.785743	-0.10498	-1.32603
1408	2	14	0.1	6	0.1	150	5	4	1	1	0	6	1.9282	0.956	0.1097	0.0891	-0.51426	0.666775	4.44358	-1.10761
1409	2	6	0.01	6	0.01	50	45	4	9	1	0	6	100.5485	0	0	0	2.023885	-1.91807	-0.43401	-1.32603
1410	2	6	0.01	6	0.01	150	5	14	1	1	0	6	3.0976	0	0	0	-0.48416	-1.91807	-0.43401	-1.32603
1411	-2	14	0.01	1	0.1	150	5	4	1	1	0	6	5.9816	0.5286	0.0001	0.9933	-0.40994	-0.48884	-0.42956	1.108877
1412	-2	6	0.1	1	0.01	50	5	14	1	1	0	6	2.1371	0.9609	0.0509	0.1725	-0.50888	0.680024	1.829157	-0.90317
1413	-2	14	0.1	1	0.1	50	5	14	9	1	0	6	6.5592	0.3362	0.0028	0.3278	-0.39507	-1.00905	-0.30951	-0.52248
1414	2	14	0.1	6	0.01	150	45	4	9	1	0	6	67.4734	0.9494	0.0755	0.0682	1.172646	0.64893	2.922946	-1.15885
1415	-2	6	0.01	6	0.01	150	45	14	9	1	0	6	1.9083	0.956	0.0851	0.112	-0.51477	0.666775	3.349791	-1.05148
1416	2	14	0.01	1	0.01	150	45	4	1	1	0	6	3.1095	0.8084	0.009	0.3293	-0.48386	0.267692	-0.03384	-0.5188
1417	-2	14	0.01	6	0.01	150	45	14	1	1	0	6	68.0794	0	0	0	1.188242	-1.91807	-0.43401	-1.32603
1418	2	14	0.01	6	0.1	150	45	14	1	1	0	6	2.1506	0.9452	0.0017	0.9337	-0.50854	0.637574	-0.35842	0.962778
1419	2	6	0.1	1	0.01	50	5	4	1	1	0	6	3.8444	0.4847	0.0001	0.9634	-0.46494	-0.60753	-0.42956	1.035582
1420	-2	6	0.1	1	0.01	150	45	4	9	1	0	6	114.0154	0.9697	0.0882	0.0848	2.370476	0.703817	3.487626	-1.11815
1421	-2	6	0.1	1	0.1	150	5	4	1	1	0	6	10.6473	0	0	0	-0.28986	-1.91807	-0.43401	-1.32603
1422	2	6	0.01	6	0.01	150	5	4	9	1	0	6	1.9507	1	0	1	-0.51368	0.785743	-0.43401	1.125301
1423	2	14	0.01	1	0.01	150	5	14	9	1	0	6	5.0767	0.7892	0.0003	0.9481	-0.43323	0.215778	-0.42067	0.998077
1424	-2	6	0.01	1	0.1	150	45	14	1	1	0	6	8.3602	0	0.013	0	-0.34872	-1.91807	0.14401	-1.32603
1425	-2	14	0.01	1	0.01	150	45	4	9	1	0	6	109.428	0.7755	0.0001	0.9834	2.252412	0.178736	-0.42956	1.084609
1426	-2	6	0.01	6	0.1	150	45	4	9	1	0	6	3.5104	0.8487	0.0005	0.9808	-0.47354	0.376655	-0.41178	1.078235
1427	2	6	0.01	1	0.01	50	5	14	9	1	0	6	2.2061	1	0	1	-0.50711	0.785743	-0.43401	1.125301
1428	-2	6	0.1	6	0.1	150	45	14	9	1	0	6	3.3673	0.4847	0.0001	0.9753	-0.47722	-0.60753	-0.42956	1.064753
1429	-2	14	0.1	1	0.01	50	5	4	1	1	0	6	2.0992	0.9452	0.0017	0.9337	-0.50986	0.637574	-0.35842	0.962778
1430	-2	6	0.1	6	0.01	150	45	4	1	1	0	6	165.1322	0	0	0	3.686045	-1.91807	-0.43401	-1.32603
1431	2	14	0.1	1	0.01	50	45	4	9	1	0	6	1.9799	0.8264	0.0057	0.5613	-0.51293	0.31636	-0.18057	0.049903
1432	-2	14	0.1	6	0.01	50	45	14	9	1	0	6	1.2906	1	0	1	-0.53067	0.785743	-0.43401	1.125301
1433	-2	14	0.1	6	0.1	50	5	14	1	1	0	6	4.2139	0.6959	0.0013	0.7153	-0.45543	-0.03649	-0.37621	0.427408
1434	2	6	0.01	1	0.01	50	45	14	1	1	0	6	2.9379	0	0.0005	0	-0.48827	-1.91807	-0.41178	-1.32603
1435	2	6	0.1	6	0.1	150	45	4	1	1	0	6	1.2079	1	0	1	-0.5328	0.785743	-0.43401	1.125301
1436	-2	14	0.1	6	0.01	150	5	14	9	1	0	6	2.6948	0.9561	0.0056	0.8669	-0.49453	0.667045	-0.18502	0.799029
1437	-2	14	0.01	1	0.1	50	45	14	9	1	0	6	27.7082	0.8774	0.0188	0.3077	0.149228	0.454255	0.401896	-0.57175
1438	-2	14	0.01	6	0.01	50	5	4	9	1	0	6	3.8016	1	0.0033	0	-0.46605	0.785743	-0.28728	-1.32603
1439	2	14	0.1	6	0.1	50	45	4	1	1	0	6	1.4517	1	0	1	-0.52652	0.785743	-0.43401	1.125301
1440	-2	6	0.01	6	0.1	50	45	14	1	1	0	6	2.888	0.6959	0.0013	0.7203	-0.48956	-0.03649	-0.37621	0.439664
1441	-2	6	0.1	1	0.1	50	45	4	1	1	0	6	10.0414	0	0	0	-0.30545	-1.91807	-0.43401	-1.32603
1442	2	14	0.1	6	0.01	50	5	14	1	1	0	6	10.5645	0	0	0	-0.29199	-1.91807	-0.43401	-1.32603
1443	-2	6	0.01	1	0.01	50	5	4	1	1	0	6	1.9681	0.9121	0.0008	0.9663	-0.51323	0.548077	-0.39844	1.042691
1444	-2	6	0.1	6	0.1	50	5	4	9	1	0	6	64.2929	0.8217	0.0022	0.6582	1.090791	0.303652	-0.33619	0.287437
1445	2	14	0.1	1	0.01	150	45	14	1	1	0	6	2.4197	1	0.0056	0	-0.50161	0.785743	-0.18502	-1.32603
1446	2	14	0.01	1	0.1	50	5	14	1	1	0	6	1.2571	1	0.0505	0	-0.53153	0.785743	1.811372	-1.32603
1447	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	6	121.8827	0	0	0	2.572953	-1.91807	-0.43401	-1.32603
1448	2	10	0.055	3.5	0.055	100	25	9	5	1	0	6	5.2503	0	0	0	-0.42876	-1.91807	-0.43401	-1.32603
1449	0	6	0.055	3.5	0.055	100	25	9	5	1	0	6	3.1456	0.6218	0.0017	0.6016	-0.48293	-0.23684	-0.35842	0.148692
1450	0	14	0.055	3.5	0.055	100	25	9	5	1	0	6	114.9727	0.8845	0.0042	0.5939	2.395114	0.473452	-0.24726	0.129817
1451	0	10	0.01	3.5	0.055	100	25	9	5	1	0	6	3.3264	1	0.0498	0	-0.47828	0.785743	1.780248	-1.32603
1452	0	10	0.1	3.5	0.055	100	25	9	5	1	0	6	2.2268	1	0	1	-0.50658	0.785743	-0.43401	1.125301
1453	0	10	0.055	1	0.055	100	25	9	5	1	0	6	76.0894	0.7149	0.0131	0.303	1.394392	0.014885	0.148457	-0.58327
1454	0	10	0.055	6	0.055	100	25	9	5	1	0	6	71.8929	0.8438	0.004	0.5233	1.286389	0.363407	-0.25616	-0.04325
1455	0	10	0.055	3.5	0.01	100	25	9	5	1	0	6	3.0326	0	0	0	-0.48584	-1.91807	-0.43401	-1.32603
1456	0	10	0.055	3.5	0.1	100	25	9	5	1	0	6	2.7655	0.9776	0.0024	0.9161	-0.49271	0.725177	-0.3273	0.919634
1457	0	10	0.055	3.5	0.055	50	25	9	5	1	0	6	7.5626	0	0	0	-0.36925	-1.91807	-0.43401	-1.32603
1458	0	10	0.055	3.5	0.055	150	25	9	5	1	0	6	2.7704	0.9845	0.0282	0.5339	-0.49259	0.743834	0.819848	-0.01726
1459	0	10	0.055	3.5	0.055	100	5	9	5	1	0	6	6.6336	0	0.0004	0	-0.39316	-1.91807	-0.41622	-1.32603
1460	0	10	0.055	3.5	0.055	100	45	9	5	1	0	6	2.6752	0.8495	0.0808	0.1179	-0.49504	0.378819	3.1586	-1.03702
1461	0	10	0.055	3.5	0.055	100	25	4	5	1	0	6	3.69	0.9742	0.0017	0.9555	-0.46892	0.715984	-0.35842	1.016217
1462	0	10	0.055	3.5	0.055	100	25	14	5	1	0	6	4.7526	1	0	1	-0.44157	0.785743	-0.43401	1.125301
1463	0	10	0.055	3.5	0.055	100	25	9	1	1	0	6	3.4609	0.5046	0.0005	0.9742	-0.47481	-0.55373	-0.41178	1.062056
1464	0	10	0.055	3.5	0.055	100	25	9	9	1	0	6	6.9764	0.3362	0.0033	0.2926	-0.38434	-1.00905	-0.28728	-0.60877

1465	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	5.6766	0.3362	0.0019	0.4202	-0.41779	-1.00905	-0.34953	-0.29598
1466	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	8.0305	0	0	0	-0.35721	-1.91807	-0.43401	-1.32603
1467	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	1.2162	1	0	1	-0.53258	0.785743	-0.43401	1.125301
1468	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	3.4593	0.6218	0.0019	0.5759	-0.47486	-0.23684	-0.34953	0.085693
1469	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	1.2022	1	0	1	-0.53295	0.785743	-0.43401	1.125301
1470	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	114.7745	0.9312	0.0054	0.5828	2.390013	0.59972	-0.19391	0.102607
1471	2	6	0.01	6	0.1	50	5	4	1	0	0	6	3.4788	1	0.0045	0	-0.47435	0.785743	-0.23392	-1.32603
1472	2	6	0.1	1	0.1	50	45	14	9	0	0	6	97.2058	0.8845	0.0055	0.531	1.937855	0.473452	-0.18946	-0.02437
1473	2	14	0.01	6	0.1	50	5	14	9	0	0	6	2.4847	0.7558	0.0085	0.4851	-0.49994	0.125471	-0.05607	-0.13689
1474	2	14	0.1	1	0.1	150	45	4	9	0	0	6	2.5102	0.4195	0	0.9977	-0.49928	-0.78382	-0.43401	1.119663
1475	2	14	0.01	1	0.1	50	5	4	9	0	0	6	122.2231	0.8487	0.0029	0.7073	2.581714	0.376655	-0.30507	0.407797
1476	-2	6	0.01	1	0.1	150	5	14	9	0	0	6	2.3331	0.9586	0.0193	0.6623	-0.50384	0.673805	0.424127	0.297487
1477	2	6	0.1	6	0.1	150	5	14	9	0	0	6	101.0417	0.9689	0.067	0.1061	2.036578	0.701654	2.545011	-1.06594
1478	2	14	0.1	6	0.1	150	5	4	1	0	0	6	3.805	0	0.0014	0	-0.46596	-1.91807	-0.37176	-1.32603
1479	2	6	0.01	6	0.01	50	45	4	9	0	0	6	98.534	0.9624	0.0342	0.1818	1.972038	0.684079	1.086626	-0.88038
1480	2	6	0.01	6	0.01	150	5	14	1	0	0	6	14.8365	1	0	1	-0.18205	0.785743	-0.43401	1.125301
1481	-2	14	0.01	1	0.1	150	5	4	1	0	0	6	4.5019	0.8825	0.0018	0.9483	-0.44802	0.468044	-0.35397	0.998567
1482	-2	6	0.1	1	0.01	50	5	14	1	0	0	6	65.0604	0.954	0.0788	0.0645	1.110544	0.661367	3.069674	-1.16792
1483	-2	14	0.1	1	0.1	50	5	14	9	0	0	6	3.2843	0.9168	0.0009	0.9631	-0.47936	0.560785	-0.39399	1.034847
1484	2	14	0.1	6	0.01	150	45	4	9	0	0	6	4.129	0	0.0018	0	-0.45762	-1.91807	-0.35397	-1.32603
1485	-2	6	0.01	6	0.01	150	45	14	9	0	0	6	72.7234	0.8013	0.0038	0.5187	1.307763	0.248495	-0.26505	-0.05452
1486	2	14	0.01	1	0.01	150	45	4	1	0	0	6	2.8489	0.75	0.0016	0.6894	-0.49056	0.109789	-0.36287	0.363918
1487	-2	14	0.01	6	0.01	150	45	14	1	0	0	6	5.1072	0.9206	0.0011	0.9696	-0.43244	0.57106	-0.3851	1.05078
1488	2	14	0.01	6	0.1	150	45	14	1	0	0	6	3.9326	0.784	0.031	0.0989	-0.46267	0.201719	0.944344	-1.08359
1489	2	6	0.1	1	0.01	50	5	4	1	0	0	6	2.4711	0.9583	0.1394	0.0753	-0.50029	0.672994	5.764131	-1.14144
1490	-2	6	0.1	1	0.01	150	45	4	9	0	0	6	1.1733	1	0	1	-0.53369	0.785743	-0.43401	1.125301
1491	-2	6	0.1	1	0.1	150	5	4	1	0	0	6	2.9686	1	0	1	-0.48748	0.785743	-0.43401	1.125301
1492	2	6	0.01	6	0.01	150	5	4	9	0	0	6	26.4869	0.8758	0.0146	0.3612	0.117796	0.449929	0.215151	-0.44061
1493	2	14	0.01	1	0.01	150	5	14	9	0	0	6	2.1567	0.8264	0.006	0.5484	-0.50838	0.31636	-0.16723	0.018281
1494	-2	6	0.01	1	0.1	150	45	14	1	0	0	6	8.0203	0	0.0002	0	-0.35747	-1.91807	-0.42512	-1.32603
1495	-2	14	0.01	1	0.01	150	45	4	9	0	0	6	5.2843	0.9428	0.0017	0.9539	-0.42789	0.631085	-0.35842	1.012294
1496	-2	6	0.01	6	0.1	150	45	4	9	0	0	6	93.2786	0.8896	0.0006	0.9062	1.836783	0.487242	-0.40733	0.895366
1497	2	6	0.01	1	0.01	50	5	14	9	0	0	6	65.2068	0.7974	0.0043	0.4784	1.114312	0.23795	-0.24282	-0.15331
1498	-2	6	0.1	6	0.1	150	45	14	9	0	0	6	7.7039	0	0.001	0	-0.36561	-1.91807	-0.38955	-1.32603
1499	-2	14	0.1	1	0.01	50	5	4	1	0	0	6	1.2261	1	0	1	-0.53233	0.785743	-0.43401	1.125301
1500	-2	6	0.1	6	0.01	150	45	4	1	0	0	6	2.666	1	0.0042	0	-0.49527	0.785743	-0.24726	-1.32603
1501	2	14	0.1	1	0.01	50	45	4	9	0	0	6	2.3983	0.782	0.0085	0.4298	-0.50216	0.196311	-0.05607	-0.27245
1502	-2	14	0.1	6	0.01	50	45	14	9	0	0	6	3.2438	0.5208	0.0008	0.8523	-0.4804	-0.50993	-0.39844	0.76324
1503	-2	14	0.1	6	0.1	50	5	14	1	0	0	6	3.7266	0.6218	0.0022	0.5362	-0.46798	-0.23684	-0.33619	-0.01162
1504	2	6	0.01	1	0.01	50	45	14	1	0	0	6	1.8758	1	0	1	-0.51561	0.785743	-0.43401	1.125301
1505	2	6	0.1	6	0.1	150	45	4	1	0	0	6	1.8937	1	0	1	-0.51515	0.785743	-0.43401	1.125301
1506	-2	14	0.1	6	0.01	150	5	14	9	0	0	6	4.2708	0.9428	0.0017	0.9539	-0.45397	0.631085	-0.35842	1.012294
1507	-2	14	0.01	1	0.1	50	45	14	9	0	0	6	2.9155	1	0	1	-0.48885	0.785743	-0.43401	1.125301
1508	-2	14	0.01	6	0.01	50	5	4	9	0	0	6	1.9264	0.8264	0.006	0.5484	-0.51431	0.31636	-0.16723	0.018281
1509	2	14	0.1	6	0.1	50	45	4	1	0	0	6	3.9624	0.9663	0.0053	0.8741	-0.46191	0.694624	-0.19835	0.816679
1510	-2	6	0.01	6	0.1	50	45	14	1	0	0	6	3.9971	0.5149	0.0012	0.6402	-0.46101	-0.52588	-0.38065	0.243313
1511	-2	6	0.1	1	0.1	50	45	4	1	0	0	6	113.7956	0.9754	0.0967	0.0801	2.364819	0.719229	3.865562	-1.12968
1512	2	14	0.1	6	0.01	50	5	14	1	0	0	6	2.1811	1	0	1	-0.50775	0.785743	-0.43401	1.125301
1513	-2	6	0.01	1	0.01	50	5	4	1	0	0	6	2.7976	1	0	1	-0.49189	0.785743	-0.43401	1.125301
1514	-2	6	0.1	6	0.1	50	5	4	9	0	0	6	3.1099	0.8802	0.029	0.1424	-0.48385	0.461826	0.855418	-0.97696
1515	2	14	0.1	1	0.01	150	45	14	1	0	0	6	4.7272	0.9428	0.0017	0.9539	-0.44222	0.631085	-0.35842	1.012294
1516	2	14	0.01	1	0.1	50	5	14	1	0	0	6	26.4614	0.8649	0.0076	0.51	0.117139	0.420457	-0.09609	-0.07585
1517	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	6	2.3943	1	0.0065	0	-0.50226	0.785743	-0.145	-1.32603
1518	2	10	0.055	3.5	0.055	100	25	9	5	0	0	6	3.1066	0.8826	0.0018	0.9474	-0.48393	0.468315	-0.35397	0.996361
1519	0	6	0.055	3.5	0.055	100	25	9	5	0	0	6	24.6474	1	0	1	0.070453	0.785743	-0.43401	1.125301
1520	0	14	0.055	3.5	0.055	100	25	9	5	0	0	6	1.888	1	0	1	-0.51529	0.785743	-0.43401	1.125301
1521	0	10	0.01	3.5	0.055	100	25	9	5	0	0	6	103.7558	0.8455	0.0004	0.9444	2.106429	0.368003	-0.41622	0.989007
1522	0	10	0.1	3.5	0.055	100	25	9	5	0	0	6	7.0254	0	0.0066	0	-0.38308	-1.91807	-0.14055	-1.32603
1523	0	10	0.055	1	0.055	100	25	9	5	0	0	6	10.8202	0	0	0	-0.28541	-1.91807	-0.43401	-1.32603
1524	0	10	0.055	6	0.055	100	25	9	5	0	0	6	3.4308	0.4572	0.0001	0.9937	-0.47559	-0.68189	-0.42956	1.109857
1525	0	10	0.055	3.5	0.01	100	25	9	5	0	0	6	29.1986	0.7611	0.0052	0.6199	0.187585	0.139801	-0.2028	0.193551
1526	0	10	0.055	3.5	0.1	100	25	9	5	0	0	6	113.7897	0.9751	0.0488	0.1459	2.364667	0.718418	1.735785	-0.96838
1527	0	10	0.055	3.5	0.055	50	25	9	5	0	0	6	2.2144	0.9632	0.002	0.9274	-0.50689	0.686242	-0.34508	0.947334
1528	0	10	0.055	3.5	0.055	150	25	9	5	0	0	6	3.8036	0.6667	0.0225	0.2626	-0.46599	-0.11544	0.566409	-0.68231
1529	0	10	0.055	3.5	0.055	100	5	9	5	0	0	6	3.9833	0.4572	0.0001	0.9937	-0.46137	-0.68189	-0.42956	1.109857
1530	0	10	0.055	3.5	0.055	100	45	9	5	0	0	6	26.1505	1	0.0009	0	0.109138	0.785743	-0.39399	-1.32603
1531	0	10	0.055	3.5	0.055	100	25	4	5	0	0	6	2.7438	0.6959	0.0015	0.6913	-0.49327	-0.03649	-0.36731	0.368576
1532	0	10	0.055	3.5	0.055	100	25	14	5	0	0	6	2.0378	1	0	1	-0.51144	0.785743	-0.43401	1.125301
1533	0	10	0.055	3.5	0.055	100	25	9	1	0	0	6	2.2025	0.9944	0.039	0.4552	-0.5072	0.770601	1.300048	-0.21018
1534	0	10	0.055	3.5	0.055	100	25	9	9	0	0	6	1.6853	0.9558	0.0787	0.1194	-0.52051	0.666234	3.065228	-1.03334
1535	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	2.0605	1	0	1	-0.51086	0.785743	-0.43401	1.125301
1536	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	1.4975	1	0	1	-0.52535	0.785743	-0.43401	1.125301

1537	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	3.1912	0.8385	0.002	0.6853	-0.48176	0.349077	-0.34508	0.353868
1538	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	3.2858	0.9254	0.0101	0.7879	-0.47932	0.584038	0.015068	0.605374
1539	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	3.7362	0.6048	0.0047	0.4721	-0.46773	-0.28281	-0.22503	-0.16875
1540	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	3.0298	0.4518	0	0.9979	-0.48591	-0.69649	-0.43401	1.120153
1541	2	6	0.01	6	0.1	50	5	4	1	1	1	6	2.547	1	0.124	0	-0.49833	0.785743	5.079401	-1.32603
1542	2	6	0.1	1	0.1	50	45	14	9	1	1	6	5.1627	0.8368	0.002	0.7227	-0.43102	0.34448	-0.34508	0.445548
1543	2	14	0.01	6	0.1	50	5	14	9	1	1	6	28.7068	0.7784	0.0065	0.5898	0.174928	0.186577	-0.145	0.119766
1544	2	14	0.1	1	0.1	150	45	4	9	1	1	6	5.8663	0	0	0	-0.41291	-1.91807	-0.43401	-1.32603
1545	2	14	0.01	1	0.1	50	5	4	9	1	1	6	1.9828	1	0	1	-0.51286	0.785743	-0.43401	1.125301
1546	-2	6	0.01	1	0.1	150	5	14	9	1	1	6	3.6335	0.8429	0.0001	0.9963	-0.47037	0.360973	-0.42956	1.116231
1547	2	6	0.1	6	0.1	150	5	14	9	1	1	6	1.8182	0.9943	0.0355	0.4758	-0.51709	0.770331	1.144427	-0.15969
1548	2	14	0.1	6	0.1	150	5	4	1	1	1	6	4.5444	0	0.0019	0	-0.44693	-1.91807	-0.34953	-1.32603
1549	2	6	0.01	6	0.01	50	45	4	9	1	1	6	2.8358	1	0	1	-0.4909	0.785743	-0.43401	1.125301
1550	2	6	0.01	6	0.01	150	5	14	1	1	1	6	3.7573	1	0	1	-0.46719	0.785743	-0.43401	1.125301
1551	-2	14	0.01	1	0.1	150	5	4	1	1	1	6	4.7377	0.8696	0.0044	0.5072	-0.44195	0.433165	-0.23837	-0.08271
1552	-2	6	0.1	1	0.01	50	5	14	1	1	1	6	6.4003	0.8571	0.0039	0.5391	-0.39916	0.399368	-0.2606	-0.00452
1553	-2	14	0.1	1	0.1	50	5	14	9	1	1	6	2.9693	1	0	1	-0.48747	0.785743	-0.43401	1.125301
1554	2	14	0.1	6	0.01	150	45	4	9	1	1	6	134.8883	0	0	0	2.907672	-1.91807	-0.43401	-1.32603
1555	-2	6	0.01	6	0.01	150	45	14	9	1	1	6	1.9085	0.9574	0.1274	0.0802	-0.51477	0.67056	5.230575	-1.12943
1556	2	14	0.01	1	0.01	150	45	4	1	1	1	6	2.5234	0	0	0	-0.49894	-1.91807	-0.43401	-1.32603
1557	-2	14	0.01	6	0.01	150	45	14	1	1	1	6	3.7568	0.8566	0.0004	0.9808	-0.4672	0.398016	-0.41622	1.078235
1558	2	14	0.01	6	0.1	150	45	14	1	1	1	6	5.7187	0	0	0	-0.41671	-1.91807	-0.43401	-1.32603
1559	2	6	0.1	1	0.01	50	5	4	1	1	1	6	3.7658	0	0.0018	0	-0.46697	-1.91807	-0.35397	-1.32603
1560	-2	6	0.1	1	0.01	150	45	4	9	1	1	6	2.4051	1	0	1	-0.50199	0.785743	-0.43401	1.125301
1561	-2	6	0.1	1	0.1	150	5	4	1	1	1	6	1.224	1	0	1	-0.53238	0.785743	-0.43401	1.125301
1562	2	6	0.01	6	0.01	150	5	4	9	1	1	6	2.6081	0.8275	0.015	0.6821	-0.49676	0.319335	0.232936	0.346024
1563	2	14	0.01	1	0.01	150	5	14	9	1	1	6	1.264	1	0	1	-0.53135	0.785743	-0.43401	1.125301
1564	-2	6	0.01	1	0.1	150	45	14	1	1	1	6	4.1325	0.9664	0.0075	0.8313	-0.45753	0.694895	-0.10054	0.711762
1565	-2	14	0.01	1	0.01	150	45	4	9	1	1	6	3.5953	0	0.0019	0	-0.47135	-1.91807	-0.34953	-1.32603
1566	-2	6	0.01	6	0.1	150	45	4	9	1	1	6	3.3503	0.8294	0	1	-0.47766	0.324472	-0.43401	1.125301
1567	2	6	0.01	1	0.01	50	5	14	9	1	1	6	3.0516	1	0.0053	0	-0.48535	0.785743	-0.19835	-1.32603
1568	-2	6	0.1	6	0.1	150	45	14	9	1	1	6	4.2623	0.7626	0.0162	0.3656	-0.45419	0.143857	0.286292	-0.42982
1569	-2	14	0.1	1	0.01	50	5	4	1	1	1	6	3.6915	0.5191	0.0014	0.61	-0.46888	-0.51452	-0.37176	0.169283
1570	-2	6	0.1	6	0.01	150	45	4	1	1	1	6	5.422	1	0	1	-0.42434	0.785743	-0.43401	1.125301
1571	2	14	0.1	1	0.01	50	45	4	9	1	1	6	4.1163	1	0	1	-0.45795	0.785743	-0.43401	1.125301
1572	-2	14	0.1	6	0.01	50	45	14	9	1	1	6	9.6445	0	0.0032	0	-0.31567	-1.91807	-0.29173	-1.32603
1573	-2	14	0.1	6	0.1	50	5	14	1	1	1	6	74.1522	0.8785	0.0023	0.7315	1.344535	0.457229	-0.33174	0.467119
1574	2	6	0.01	1	0.01	50	45	14	1	1	1	6	1.8988	0.8846	0.0111	0.4326	-0.51502	0.473722	0.059531	-0.26558
1575	2	6	0.1	6	0.1	150	45	4	1	1	1	6	1.1852	1	0	1	-0.53338	0.785743	-0.43401	1.125301
1576	-2	14	0.1	6	0.01	150	5	14	9	1	1	6	26.7385	0	0	0	0.124271	-1.91807	-0.43401	-1.32603
1577	-2	14	0.01	1	0.1	50	45	14	9	1	1	6	112.074	0	0	0	2.320511	-1.91807	-0.43401	-1.32603
1578	-2	14	0.01	6	0.01	50	5	4	9	1	1	6	19.7633	0	0	0	-0.05525	-1.91807	-0.43401	-1.32603
1579	2	14	0.1	6	0.1	50	45	4	1	1	1	6	3.4029	0.9306	0.0087	0.8559	-0.47631	0.598098	-0.04718	0.772064
1580	-2	6	0.01	6	0.1	50	45	14	1	1	1	6	1.901	0.9582	0.0023	0.9151	-0.51496	0.672723	-0.33174	0.917183
1581	-2	6	0.1	1	0.1	50	45	4	1	1	1	6	113.8857	0.9753	0.0495	0.1451	2.367138	0.718959	1.766909	-0.97034
1582	2	14	0.1	6	0.01	50	5	14	1	1	1	6	148.0995	0	0	0	3.247683	-1.91807	-0.43401	-1.32603
1583	-2	6	0.01	1	0.01	50	5	4	1	1	1	6	3.6893	0.4847	0.0001	0.9753	-0.46894	-0.60753	-0.42956	1.064753
1584	-2	6	0.1	6	0.1	50	5	4	9	1	1	6	27.6419	0.8758	0.013	0.3873	0.147521	0.449929	0.14401	-0.37663
1585	2	14	0.1	1	0.01	150	45	14	1	1	1	6	10.1528	0.9035	0.0056	0.5374	-0.30259	0.524825	-0.18502	-0.00868
1586	2	14	0.01	1	0.1	50	5	14	1	1	1	6	11.5425	0	0	0	-0.26682	-1.91807	-0.43401	-1.32603
1587	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	6	82.7214	0	0	0	1.565077	-1.91807	-0.43401	-1.32603
1588	2	10	0.055	3.5	0.055	100	25	9	5	1	1	6	119.1149	0.911	0.0089	0.4234	2.501719	0.545103	-0.03829	-0.28813
1589	0	6	0.055	3.5	0.055	100	25	9	5	1	1	6	3.888	0.9315	0.0141	0.7423	-0.46382	0.600531	0.19292	0.493594
1590	0	14	0.055	3.5	0.055	100	25	9	5	1	1	6	27.5034	0.7913	0.0078	0.5621	0.143957	0.221456	-0.0872	0.051865
1591	0	10	0.01	3.5	0.055	100	25	9	5	1	1	6	28.6576	0.7784	0.0065	0.5898	0.173662	0.186577	-0.145	0.119766
1592	0	10	0.1	3.5	0.055	100	25	9	5	1	1	6	5.58	0.6492	0.0002	0.9897	-0.42028	-0.16276	-0.42512	1.100052
1593	0	10	0.055	1	0.055	100	25	9	5	1	1	6	5.2093	0	0.0004	0	-0.42982	-1.91807	-0.41622	-1.32603
1594	0	10	0.055	6	0.055	100	25	9	5	1	1	6	3.2974	0.4199	0.0009	0.9416	-0.47902	-0.78274	-0.39399	0.982143
1595	0	10	0.055	3.5	0.01	100	25	9	5	1	1	6	2.9446	0.9093	0.0005	0.9761	-0.4881	0.540507	-0.41178	1.066714
1596	0	10	0.055	3.5	0.1	100	25	9	5	1	1	6	116.598	0	0	0	2.436943	-1.91807	-0.43401	-1.32603
1597	0	10	0.055	3.5	0.055	50	25	9	5	1	1	6	11.9123	0	0	0	-0.2573	-1.91807	-0.43401	-1.32603
1598	0	10	0.055	3.5	0.055	150	25	9	5	1	1	6	2.9225	0.4309	0.0012	0.9296	-0.48867	-0.753	-0.38065	0.952727
1599	0	10	0.055	3.5	0.055	100	5	9	5	1	1	6	4.8509	0	0.0012	0	-0.43904	-1.91807	-0.38065	-1.32603
1600	0	10	0.055	3.5	0.055	100	45	9	5	1	1	6	3.6196	0.6218	0.0022	0.5362	-0.47073	-0.23684	-0.33619	-0.01162
1601	0	10	0.055	3.5	0.055	100	25	4	5	1	1	6	1.2268	1	0	1	-0.53231	0.785743	-0.43401	1.125301
1602	0	10	0.055	3.5	0.055	100	25	14	5	1	1	6	2.2788	1	0	1	-0.50524	0.785743	-0.43401	1.125301
1603	0	10	0.055	3.5	0.055	100	25	9	1	1	1	6	1.4912	1	0	1	-0.52551	0.785743	-0.43401	1.125301
1604	0	10	0.055	3.5	0.055	100	25	9	9	1	1	6	2.9393	1	0	1	-0.48824	0.785743	-0.43401	1.125301
1605	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	9.6945	0	0	0	-0.31438	-1.91807	-0.43401	-1.32603
1606	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	2.7397	0.8927	0.0361	0.1252	-0.49338	0.495623	1.171105	-1.01912
1607	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	5.2072	0	0.0019	0	-0.42987	-1.91807	-0.34953	-1.32603
1608	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	2.417	1	0	1	-0.50168	0.785743	-0.43401	1.125301

1609	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	1.7112	1	0	1	-0.51985	0.785743	-0.43401	1.125301
1610	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	2.3613	1	0	1	-0.50311	0.785743	-0.43401	1.125301
1611	2	6	0.01	6	0.1	50	5	4	1	0	1	6	9.8719	0	0	0	-0.30982	-1.91807	-0.43401	-1.32603
1612	2	6	0.1	1	0.1	50	45	14	9	0	1	6	1.7675	0.9632	0.0022	0.9181	-0.5184	0.686242	-0.33619	0.924537
1613	2	14	0.01	6	0.1	50	5	14	9	0	1	6	2.7423	0.4195	0.0011	0.9295	-0.49331	-0.78382	-0.3851	0.952482
1614	2	14	0.1	1	0.1	150	45	4	9	0	1	6	3.2645	1	0.0911	0.3109	-0.47987	0.785743	3.616569	-0.56391
1615	2	14	0.01	1	0.1	50	5	4	9	0	1	6	2.3466	1	0	1	-0.50349	0.785743	-0.43401	1.125301
1616	-2	6	0.01	1	0.1	150	5	14	9	0	1	6	2.994	1	0.0427	0	-0.48683	0.785743	1.464561	-1.32603
1617	2	6	0.1	6	0.1	150	5	14	9	0	1	6	3.3126	0	0	0	-0.47863	-1.91807	-0.43401	-1.32603
1618	2	14	0.1	6	0.1	150	5	4	1	0	1	6	6.0167	0.9428	0.0014	0.9617	-0.40904	0.631085	-0.37176	1.031415
1619	2	6	0.01	6	0.01	50	45	4	9	0	1	6	100.2659	0.9705	0.077	0.0909	2.016611	0.70598	2.989641	-1.1032
1620	2	6	0.01	6	0.01	150	5	14	1	0	1	6	1.2152	1	0.0013	0	-0.53261	0.785743	-0.37621	-1.32603
1621	-2	14	0.01	1	0.1	150	5	4	1	0	1	6	4.656	0.6302	0.0538	0.1219	-0.44406	-0.21413	1.9581	-1.02721
1622	-2	6	0.1	1	0.01	50	5	14	1	0	1	6	5.8005	0	0.0011	0	-0.4146	-1.91807	-0.3851	-1.32603
1623	-2	14	0.1	1	0.1	50	5	14	9	0	1	6	27.4628	0.7737	0.006	0.6025	0.142912	0.173869	-0.16723	0.150898
1624	2	14	0.1	6	0.01	150	45	4	9	0	1	6	25.9266	1	0	1	0.103375	0.785743	-0.43401	1.125301
1625	-2	6	0.01	6	0.01	150	45	14	9	0	1	6	4.2175	1	0.0048	0	-0.45534	0.785743	-0.22059	-1.32603
1626	2	14	0.01	1	0.01	150	45	4	1	0	1	6	1.6466	1	0	1	-0.52151	0.785743	-0.43401	1.125301
1627	-2	14	0.01	6	0.01	150	45	14	1	0	1	6	4.4812	0	0	0	-0.44856	-1.91807	-0.43401	-1.32603
1628	2	14	0.01	6	0.1	150	45	14	1	0	1	6	2.3448	0.9558	0.0655	0.1401	-0.50354	0.666234	2.478317	-0.9826
1629	2	6	0.1	1	0.01	50	5	4	1	0	1	6	5.8424	0.6795	0.0001	0.9951	-0.41352	-0.08083	-0.42956	1.113289
1630	-2	6	0.1	1	0.01	150	45	4	9	0	1	6	2.3672	0.4636	0.0014	0.9228	-0.50296	-0.66458	-0.37176	0.936058
1631	-2	6	0.1	1	0.1	150	5	4	1	0	1	6	123.6265	0.9539	0.0021	0.7972	2.617832	0.661097	-0.34064	0.628172
1632	2	6	0.01	6	0.01	150	5	4	9	0	1	6	3.5095	0.6218	0.0022	0.5362	-0.47356	-0.23684	-0.33619	-0.01162
1633	2	14	0.01	1	0.01	150	5	14	9	0	1	6	1.8996	0.7688	0.003	0.7151	-0.515	0.160621	-0.30062	0.426918
1634	-2	6	0.01	1	0.1	150	45	14	1	0	1	6	2.2179	0.9632	0.002	0.9274	-0.5068	0.686242	-0.34508	0.947334
1635	-2	14	0.01	1	0.01	150	45	4	9	0	1	6	3.4629	0.8826	0.0018	0.9474	-0.47476	0.468315	-0.35397	0.996361
1636	-2	6	0.01	6	0.1	150	45	4	9	0	1	6	9.9097	0	0	0	-0.30884	-1.91807	-0.43401	-1.32603
1637	2	6	0.01	1	0.01	50	5	14	9	0	1	6	3.3688	1	0.0007	0	-0.47718	0.785743	-0.40288	-1.32603
1638	-2	6	0.1	6	0.1	150	45	14	9	0	1	6	105.0839	0.9471	0.0006	0.9307	2.14061	0.642711	-0.40733	0.955424
1639	-2	14	0.1	1	0.01	50	5	4	1	0	1	6	5.1702	0.9428	0.0017	0.9539	-0.43082	0.631085	-0.35842	1.012294
1640	-2	6	0.1	6	0.01	150	45	4	1	0	1	6	24.692	1	0	1	0.071601	0.785743	-0.43401	1.125301
1641	2	14	0.1	1	0.01	50	45	4	9	0	1	6	10.3507	0	0	0	-0.29749	-1.91807	-0.43401	-1.32603
1642	-2	14	0.1	6	0.01	50	45	14	9	0	1	6	2.0403	0.9632	0.0022	0.9181	-0.51138	0.686242	-0.33619	0.924537
1643	-2	14	0.1	6	0.1	50	5	14	1	0	1	6	3.9067	0	0	0	-0.46334	-1.91807	-0.43401	-1.32603
1644	2	6	0.01	1	0.01	50	45	14	1	0	1	6	77.3281	0.8052	0.0013	0.7607	1.426272	0.25904	-0.37621	0.538698
1645	2	6	0.1	6	0.1	150	45	4	1	0	1	6	5.5347	0.4714	0.0014	0.9229	-0.42144	-0.64349	-0.37176	0.936303
1646	-2	14	0.1	6	0.01	150	5	14	9	0	1	6	13.3418	0	0	0	-0.22051	-1.91807	-0.43401	-1.32603
1647	-2	14	0.01	1	0.1	50	45	14	9	0	1	6	25.7533	1	0.0989	0	0.098915	0.785743	3.96338	-1.32603
1648	-2	14	0.01	6	0.01	50	5	4	9	0	1	6	4.0604	0	0	0	-0.45938	-1.91807	-0.43401	-1.32603
1649	2	14	0.1	6	0.1	50	45	4	1	0	1	6	2.5618	0.782	0.0049	0.5652	-0.49795	0.196311	-0.21614	0.059464
1650	-2	6	0.01	6	0.1	50	45	14	1	0	1	6	3.6762	0.8509	0.0043	0.5131	-0.46927	0.382604	-0.24282	-0.06825
1651	-2	6	0.1	1	0.1	50	45	4	1	0	1	6	108.216	0.9328	0.0011	0.8741	2.221219	0.604046	-0.3851	0.816679
1652	2	14	0.1	6	0.01	50	5	14	1	0	1	6	2.0533	0.8295	0.007	0.5615	-0.51104	0.324742	-0.12277	0.050394
1653	-2	6	0.01	1	0.01	50	5	4	1	0	1	6	2.59	1	0	1	-0.49723	0.785743	-0.43401	1.125301
1654	-2	6	0.1	6	0.1	50	5	4	9	0	1	6	3.1898	0.5175	0.0001	0.9867	-0.48179	-0.51885	-0.42956	1.092698
1655	2	14	0.1	1	0.01	150	45	14	1	0	1	6	140.179	0	0	0	3.043836	-1.91807	-0.43401	-1.32603
1656	2	14	0.01	1	0.1	50	5	14	1	0	1	6	2.7525	0.8735	0.027	0.1496	-0.49305	0.44371	0.766492	-0.95931
1657	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	6	114.0552	0.9726	0.0958	0.0798	2.3715	0.711658	3.825545	-1.13041
1658	2	10	0.055	3.5	0.055	100	25	9	5	0	1	6	1.6807	1	0	1	-0.52063	0.785743	-0.43401	1.125301
1659	0	6	0.055	3.5	0.055	100	25	9	5	0	1	6	3.3497	0.6048	0.0047	0.4721	-0.47768	-0.28281	-0.22503	-0.16875
1660	0	14	0.055	3.5	0.055	100	25	9	5	0	1	6	2.7497	0.9587	0.0201	0.654	-0.49312	0.674075	0.459698	0.277141
1661	0	10	0.01	3.5	0.055	100	25	9	5	0	1	6	2.6457	0.4518	0	0.9979	-0.49579	-0.69649	-0.43401	1.120153
1662	0	10	0.1	3.5	0.055	100	25	9	5	0	1	6	128.1766	0	0	0	2.734936	-1.91807	-0.43401	-1.32603
1663	0	10	0.055	1	0.055	100	25	9	5	0	1	6	2.0362	0.9415	0.0017	0.9365	-0.51148	0.62757	-0.35842	0.969641
1664	0	10	0.055	6	0.055	100	25	9	5	0	1	6	2.5798	0.7451	0.0036	0.5089	-0.49749	0.09654	-0.27394	-0.07855
1665	0	10	0.055	3.5	0.01	100	25	9	5	0	1	6	4.971	0.9428	0.0017	0.9539	-0.43595	0.631085	-0.35842	1.012294
1666	0	10	0.055	3.5	0.1	100	25	9	5	0	1	6	4.0203	0.8275	0.0419	0.0803	-0.46042	0.319335	1.42899	-1.12918
1667	0	10	0.055	3.5	0.055	50	25	9	5	0	1	6	2.8143	0.4684	0.0015	0.9168	-0.49146	-0.65161	-0.36731	0.92135
1668	0	10	0.055	3.5	0.055	150	25	9	5	0	1	6	2.0652	0.9649	0.0017	0.9353	-0.51073	0.690839	-0.35842	0.9667
1669	0	10	0.055	3.5	0.055	100	5	9	5	0	1	6	6.0138	0	0	0	-0.40911	-1.91807	-0.43401	-1.32603
1670	0	10	0.055	3.5	0.055	100	45	9	5	0	1	6	59.3566	0.9071	0.0413	0.1162	0.963748	0.534558	1.402313	-1.04118
1671	0	10	0.055	3.5	0.055	100	25	4	5	0	1	6	5.3452	0	0.0015	0	-0.42632	-1.91807	-0.36731	-1.32603
1672	0	10	0.055	3.5	0.055	100	25	14	5	0	1	6	5.9653	0.3362	0.0028	0.3278	-0.41036	-1.00905	-0.30951	-0.52248
1673	0	10	0.055	3.5	0.055	100	25	9	1	0	1	6	11.0889	1	0	1	-0.2785	0.785743	-0.43401	1.125301
1674	0	10	0.055	3.5	0.055	100	25	9	9	0	1	6	5.1911	0.7892	0.0005	0.9068	-0.43028	0.215778	-0.41178	0.896837
1675	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	1.7866	1	0	1	-0.5179	0.785743	-0.43401	1.125301
1676	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	2.3029	0.9564	0.0068	0.8425	-0.50462	0.667856	-0.13166	0.739217
1677	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	99.8947	0.8638	0.0007	0.9	2.007058	0.417483	-0.40288	0.880168
1678	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	124.8122	0.9526	0.0006	0.9306	2.648348	0.657582	-0.40733	0.955179
1679	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	3.5007	1	0.0066	0	-0.47379	0.785743	-0.14055	-1.32603
1680	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	3.8328	0.5371	0.0005	0.9777	-0.46524	-0.46585	-0.41178	1.070636

Table A.6 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 6) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 7)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
1681	2	6	0.01	6	0.1	50	5	4	1	1	0	7	3.0813	0.6959	0.0011	0.7518	-0.48458	-0.03649	-0.3851	0.516881
1682	2	6	0.1	1	0.1	50	45	14	9	1	0	7	110.9383	0.9193	0.0183	0.4312	2.291282	0.567545	0.379664	-0.26901
1683	2	14	0.01	6	0.1	50	5	14	9	1	0	7	120.0136	0.9498	0.0005	0.9476	2.524849	0.650011	-0.41178	0.996851
1684	2	14	0.1	1	0.1	150	45	4	9	1	0	7	113.8012	0.8882	0.0048	0.5665	2.364963	0.483456	-0.22059	0.06265
1685	2	14	0.01	1	0.1	50	5	4	9	1	0	7	4.1633	0.9742	0.0017	0.9555	-0.45674	0.715984	-0.35842	1.016217
1686	-2	6	0.01	1	0.1	150	5	14	9	1	0	7	2.3968	0.8596	0.0007	0.9663	-0.5022	0.406127	-0.40288	1.042691
1687	2	6	0.1	6	0.1	150	5	14	9	1	0	7	38.8519	0	0	0	0.436028	-1.91807	-0.43401	-1.32603
1688	2	14	0.1	6	0.1	150	5	4	1	1	0	7	1.1807	1	0	1	-0.5335	0.785743	-0.43401	1.125301
1689	2	6	0.01	6	0.01	50	45	4	9	1	0	7	1.8154	1	0	1	-0.51716	0.785743	-0.43401	1.125301
1690	2	6	0.01	6	0.01	150	5	14	1	1	0	7	27.4352	0.7737	0.006	0.6025	0.142201	0.173869	-0.16723	0.150898
1691	-2	14	0.01	1	0.1	150	5	4	1	1	0	7	120.6033	0.9245	0.0119	0.5231	2.540026	0.581605	0.095101	-0.04374
1692	-2	6	0.1	1	0.01	50	5	14	1	1	0	7	8.4675	0.2298	0.0004	0.6835	-0.34596	-1.29674	-0.41622	0.349456
1693	-2	14	0.1	1	0.1	50	5	14	9	1	0	7	2.0325	1	0.0062	0	-0.51158	0.785743	-0.15834	-1.32603
1694	2	14	0.1	6	0.01	150	45	4	9	1	0	7	120.0529	0.9167	0.0163	0.2862	2.52586	0.560515	0.290738	-0.62446
1695	-2	6	0.01	6	0.01	150	45	14	9	1	0	7	101.1349	0.9677	0.0747	0.0929	2.038976	0.69841	2.887376	-1.0983
1696	2	14	0.01	1	0.01	150	45	4	1	1	0	7	7.5889	1	0	1	-0.36857	0.785743	-0.43401	1.125301
1697	-2	14	0.01	6	0.01	150	45	14	1	1	0	7	2.565	0.9088	0.0008	0.9663	-0.49787	0.539155	-0.39844	1.042691
1698	2	14	0.01	6	0.1	150	45	14	1	1	0	7	15.1626	0.9194	0.003	0.7321	-0.17365	0.567815	-0.30062	0.46859
1699	2	6	0.1	1	0.01	50	5	4	1	1	0	7	2.413	0.4518	0	0.9979	-0.50178	-0.69649	-0.43401	1.120153
1700	-2	6	0.1	1	0.01	150	45	4	9	1	0	7	1.2587	1	0	1	-0.53149	0.785743	-0.43401	1.125301
1701	-2	6	0.1	1	0.1	150	5	4	1	1	0	7	6.6806	0	0	0	-0.39195	-1.91807	-0.43401	-1.32603
1702	2	6	0.01	6	0.01	150	5	4	9	1	0	7	11.9495	0	0	0	-0.25635	-1.91807	-0.43401	-1.32603
1703	2	14	0.01	1	0.01	150	5	14	9	1	0	7	2.659	0.9032	0.1009	0.0517	-0.49545	0.524013	4.052306	-1.19929
1704	-2	6	0.01	1	0.1	150	45	14	1	1	0	7	6.3437	0.2131	0.0014	0.8491	-0.40062	-1.34189	-0.37176	0.755395
1705	-2	14	0.01	1	0.01	150	45	4	9	1	0	7	5.0454	0	0	0	-0.43403	-1.91807	-0.43401	-1.32603
1706	-2	6	0.01	6	0.1	150	45	4	9	1	0	7	4.2894	0	0.0174	0	-0.45349	-1.91807	0.339648	-1.32603
1707	2	6	0.01	1	0.01	50	5	14	9	1	0	7	1.7536	1	0	1	-0.51875	0.785743	-0.43401	1.125301
1708	-2	6	0.1	6	0.1	150	45	14	9	1	0	7	5.7734	0.9858	0.0051	0.894	-0.4153	0.747349	-0.20725	0.86546
1709	-2	14	0.1	1	0.01	50	5	4	1	1	0	7	3.699	0	0.017	0	-0.46869	-1.91807	0.321862	-1.32603
1710	-2	6	0.1	6	0.01	150	45	4	1	1	0	7	115.3305	0.9711	0.0586	0.1277	2.404322	0.707603	2.171522	-1.01299
1711	2	14	0.1	1	0.01	50	45	4	9	1	0	7	4.6091	0	0	0	-0.44526	-1.91807	-0.43401	-1.32603
1712	-2	14	0.1	6	0.01	50	45	14	9	1	0	7	2.9366	0.8605	0.0266	0.154	-0.48831	0.408561	0.748707	-0.94852
1713	-2	14	0.1	6	0.1	50	5	14	1	1	0	7	2.6564	0.9581	0.0879	0.1139	-0.49552	0.672453	3.474287	-1.04682
1714	2	6	0.01	1	0.01	50	45	14	1	1	0	7	6.453	0	0	0	-0.39781	-1.91807	-0.43401	-1.32603
1715	2	6	0.1	6	0.1	150	45	4	1	1	0	7	23.2048	0	0	0	0.033326	-1.91807	-0.43401	-1.32603
1716	-2	14	0.1	6	0.01	150	5	14	9	1	0	7	2.8841	1	0.0051	0	-0.48966	0.785743	-0.20725	-1.32603
1717	-2	14	0.01	1	0.1	50	45	14	9	1	0	7	3.2565	0.9842	0.023	0.5785	-0.48007	0.743022	0.58864	0.092066
1718	-2	14	0.01	6	0.01	50	5	4	9	1	0	7	5.2729	0.9387	0.0026	0.9455	-0.42818	0.619999	-0.3184	0.991703
1719	2	14	0.1	6	0.1	50	45	4	1	1	0	7	4.5013	0.8826	0.0018	0.9474	-0.44804	0.468315	-0.35397	0.996361
1720	-2	6	0.01	6	0.1	50	45	14	1	1	0	7	24.3758	0	0	0	0.063463	-1.91807	-0.43401	-1.32603
1721	-2	6	0.1	1	0.1	50	45	4	1	1	0	7	14.9493	0	0	0	-0.17914	-1.91807	-0.43401	-1.32603
1722	2	14	0.1	6	0.01	50	5	14	1	1	0	7	2.4309	0.8242	0.0143	0.3927	-0.50132	0.310412	0.201812	-0.36339
1723	-2	6	0.01	1	0.01	50	5	4	1	1	0	7	3.0333	0	0	0	-0.48582	-1.91807	-0.43401	-1.32603
1724	-2	6	0.1	6	0.1	50	5	4	9	1	0	7	19.9485	0	0	0	-0.05048	-1.91807	-0.43401	-1.32603
1725	2	14	0.1	1	0.01	150	45	14	1	1	0	7	1.8602	0.9548	0.0498	0.173	-0.51601	0.66353	1.780248	-0.90195
1726	2	14	0.01	1	0.1	50	5	14	1	1	0	7	3.2366	0.6959	0.0011	0.7574	-0.48059	-0.03649	-0.3851	0.530609
1727	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	7	15.6063	1	0	1	-0.16223	0.785743	-0.43401	1.125301
1728	2	10	0.055	3.5	0.055	100	25	9	5	1	0	7	5.0832	0.7892	0.0003	0.9481	-0.43306	0.215778	-0.42067	0.998077
1729	0	6	0.055	3.5	0.055	100	25	9	5	1	0	7	3.2162	1	0	1	-0.48111	0.785743	-0.43401	1.125301
1730	0	14	0.055	3.5	0.055	100	25	9	5	1	0	7	2.5877	1	0.0257	0	-0.49729	0.785743	0.70869	-1.32603
1731	0	10	0.01	3.5	0.055	100	25	9	5	1	0	7	2.5439	0.8	0.0122	0.3518	-0.49841	0.24498	0.10844	-0.46365
1732	0	10	0.1	3.5	0.055	100	25	9	5	1	0	7	3.2734	0.8432	0.0001	0.9963	-0.47964	0.361785	-0.42956	1.116231
1733	0	10	0.055	1	0.055	100	25	9	5	1	0	7	7.5345	1	0	1	-0.36997	0.785743	-0.43401	1.125301
1734	0	10	0.055	6	0.055	100	25	9	5	1	0	7	27.6201	0.8758	0.013	0.3873	0.14696	0.449929	0.14401	-0.37663
1735	0	10	0.055	3.5	0.01	100	25	9	5	1	0	7	2.6601	0.9598	0.0249	0.6046	-0.49542	0.677049	0.67312	0.156046
1736	0	10	0.055	3.5	0.1	100	25	9	5	1	0	7	6.2995	0.2255	0.0018	0.3376	-0.40176	-1.30836	-0.35397	-0.49846
1737	0	10	0.055	3.5	0.055	50	25	9	5	1	0	7	2.4022	0.7654	0.0019	0.8155	-0.50206	0.151428	-0.34953	0.673031
1738	0	10	0.055	3.5	0.055	150	25	9	5	1	0	7	2.2949	0.9588	0.1048	0.0987	-0.50482	0.674346	4.225712	-1.08408
1739	0	10	0.055	3.5	0.055	100	5	9	5	1	0	7	1.3515	1	0	1	-0.5291	0.785743	-0.43401	1.125301
1740	0	10	0.055	3.5	0.055	100	45	9	5	1	0	7	4.8546	0.8385	0.0021	0.6818	-0.43894	0.349077	-0.34064	0.345288
1741	0	10	0.055	3.5	0.055	100	25	4	5	1	0	7	2.9415	0.9545	0.0549	0.1586	-0.48818	0.662719	2.007009	-0.93725
1742	0	10	0.055	3.5	0.055	100	25	14	5	1	0	7	2.3666	0.4655	0.0014	0.9213	-0.50298	-0.65945	-0.37176	0.932381
1743	0	10	0.055	3.5	0.055	100	25	9	1	1	0	7	1.4119	1	0	1	-0.52755	0.785743	-0.43401	1.125301
1744	0	10	0.055	3.5	0.055	100	25	9	9	1	0	7	4.5764	0.8116	0.0001	0.996	-0.4461	0.276344	-0.42956	1.115495

1745	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	2.5829	0.74	0.002	0.6453	-0.49741	0.082751	-0.34508	0.255815
1746	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	3.9022	0.8826	0.0018	0.9474	-0.46346	0.468315	-0.35397	0.996361
1747	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	1.1722	1	0	1	-0.53372	0.785743	-0.43401	1.125301
1748	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	1.2557	1	0	1	-0.53157	0.785743	-0.43401	1.125301
1749	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	5.1631	0.7892	0.0003	0.9481	-0.43101	0.215778	-0.42067	0.998077
1750	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	3.5034	0.8826	0.0018	0.9474	-0.47372	0.468315	-0.35397	0.996361
1751	2	6	0.01	6	0.1	50	5	4	1	0	0	7	1.5579	0.9677	0.0879	0.1121	-0.52379	0.69841	3.474287	-1.05123
1752	2	6	0.1	1	0.1	50	45	14	9	0	0	7	62.7751	0.9071	0.1157	0.0449	1.051728	0.534558	4.710358	-1.21596
1753	2	14	0.01	6	0.1	50	5	14	9	0	0	7	2.4614	0.782	0.0033	0.6624	-0.50054	0.196311	-0.28728	0.297733
1754	2	14	0.1	1	0.1	150	45	4	9	0	0	7	4.1861	1	0.0037	0	-0.45615	0.785743	-0.2695	-1.32603
1755	2	14	0.01	1	0.1	50	5	4	9	0	0	7	6.2677	0	0.0018	0	-0.40258	-1.91807	-0.35397	-1.32603
1756	-2	6	0.01	1	0.1	150	5	14	9	0	0	7	4.4006	0.8385	0.0021	0.6818	-0.45063	0.349077	-0.34064	0.345288
1757	2	6	0.1	6	0.1	150	5	14	9	0	0	7	2.4677	1	0.0112	0	-0.50038	0.785743	0.063977	-1.32603
1758	2	14	0.1	6	0.1	150	5	4	1	0	0	7	16.4977	0	0	0	-0.13929	-1.91807	-0.43401	-1.32603
1759	2	6	0.01	6	0.01	50	45	4	9	0	0	7	4.0678	1	0.0055	0	-0.45919	0.785743	-0.18946	-1.32603
1760	2	6	0.01	6	0.01	150	5	14	1	0	0	7	166.22	0	0	0	3.714042	-1.91807	-0.43401	-1.32603
1761	-2	14	0.01	1	0.1	150	5	4	1	0	0	7	2.1422	0.9631	0.0017	0.9368	-0.50875	0.685972	-0.35842	0.970377
1762	-2	6	0.1	1	0.01	50	5	14	1	0	0	7	113.9563	0.8882	0.0048	0.5665	2.368955	0.483456	-0.22059	0.06265
1763	-2	14	0.1	1	0.1	50	5	14	9	0	0	7	3.7423	0.8268	0.0232	0.1358	-0.46757	0.317442	0.597533	-0.99314
1764	2	14	0.1	6	0.01	150	45	4	9	0	0	7	19.3413	0	0	0	-0.06611	-1.91807	-0.43401	-1.32603
1765	-2	6	0.01	6	0.01	150	45	14	9	0	0	7	27.4641	0.7701	0.006	0.5975	0.142945	0.164136	-0.16723	0.138641
1766	2	14	0.01	1	0.01	150	45	4	1	0	0	7	1.17	1	0.0018	0	-0.53377	0.785743	-0.35397	-1.32603
1767	-2	14	0.01	6	0.01	150	45	14	1	0	0	7	3.5727	0.6596	0.002	0.744	-0.47194	-0.13464	-0.34508	0.497761
1768	2	14	0.01	6	0.1	150	45	14	1	0	0	7	3.4888	0.6505	0.0177	0.2966	-0.4741	-0.15924	0.352986	-0.59896
1769	2	6	0.1	1	0.01	50	5	4	1	0	0	7	141.4622	0	0	0	3.076862	-1.91807	-0.43401	-1.32603
1770	-2	6	0.1	1	0.01	150	45	4	9	0	0	7	122.4357	0.9762	0.1205	0.0676	2.587185	0.721392	4.92378	-1.16032
1771	-2	6	0.1	1	0.1	150	5	4	1	0	0	7	1.7292	1	0	1	-0.51938	0.785743	-0.43401	1.125301
1772	2	6	0.01	6	0.01	150	5	4	9	0	0	7	2.9719	0.9	0.0319	0.1358	-0.4874	0.515361	0.984361	-0.99314
1773	2	14	0.01	1	0.01	150	5	14	9	0	0	7	28.6216	0.8543	0.0249	0.3442	0.172735	0.391797	0.67312	-0.48228
1774	-2	6	0.01	1	0.1	150	45	14	1	0	0	7	2.7549	0.8531	0.0006	0.9721	-0.49298	0.388552	-0.40733	1.056909
1775	-2	14	0.01	1	0.01	150	45	4	9	0	0	7	4.0122	0.4479	0	0.9978	-0.46063	-0.70703	-0.43401	1.119908
1776	-2	6	0.01	6	0.1	150	45	4	9	0	0	7	6.0333	0	0	0	-0.40861	-1.91807	-0.43401	-1.32603
1777	2	6	0.01	1	0.01	50	5	14	9	0	0	7	3.7185	0.6218	0.0015	0.6245	-0.46818	-0.23684	-0.36731	0.204827
1778	-2	6	0.1	6	0.1	150	45	14	9	0	0	7	2.8156	0.7661	0.001	0.8086	-0.49142	0.15332	-0.38955	0.656117
1779	-2	14	0.1	1	0.01	50	5	4	1	0	0	7	1.4791	1	0	1	-0.52582	0.785743	-0.43401	1.125301
1780	-2	6	0.1	6	0.01	150	45	4	1	0	0	7	142.2861	0	0	0	3.098066	-1.91807	-0.43401	-1.32603
1781	2	14	0.1	1	0.01	50	45	4	9	0	0	7	6.1178	0.3362	0.0028	0.3278	-0.40643	-1.00905	-0.30951	-0.52248
1782	-2	14	0.1	6	0.01	50	45	14	9	0	0	7	4.042	0.7253	0.0011	0.7952	-0.45986	0.043005	-0.3851	0.623269
1783	-2	14	0.1	6	0.1	50	5	14	1	0	0	7	18.2094	0	0	0	-0.09524	-1.91807	-0.43401	-1.32603
1784	2	6	0.01	1	0.01	50	45	14	1	0	0	7	3.1672	0	0	0	-0.48237	-1.91807	-0.43401	-1.32603
1785	2	6	0.1	6	0.1	150	45	4	1	0	0	7	120.6706	0.9709	0.0524	0.1296	2.541758	0.707062	1.895852	-1.00833
1786	-2	14	0.1	6	0.01	150	5	14	9	0	0	7	86.5079	0	0	0	1.662528	-1.91807	-0.43401	-1.32603
1787	-2	14	0.01	1	0.1	50	45	14	9	0	0	7	19.0612	0	0	0	-0.07332	-1.91807	-0.43401	-1.32603
1788	-2	14	0.01	6	0.01	50	5	4	9	0	0	7	87.2237	0	0	0	1.68095	-1.91807	-0.43401	-1.32603
1789	2	14	0.1	6	0.1	50	45	4	1	0	0	7	28.0149	0	0	0	0.157121	-1.91807	-0.43401	-1.32603
1790	-2	6	0.01	6	0.1	50	45	14	1	0	0	7	2.0003	1	0	1	-0.5124	0.785743	-0.43401	1.125301
1791	-2	6	0.1	1	0.1	50	45	4	1	0	0	7	6.4237	0.939	0.0111	0.3014	-0.39856	0.62081	0.059531	-0.5872
1792	2	14	0.1	6	0.01	50	5	14	1	0	0	7	100.0841	0.8638	0.002	0.744	2.011933	0.417483	-0.34508	0.497761
1793	-2	6	0.01	1	0.01	50	5	4	1	0	0	7	6.7644	1	0.0038	0	-0.38979	0.785743	-0.26505	-1.32603
1794	-2	6	0.1	6	0.1	50	5	4	9	0	0	7	99.1188	0.8838	0.0053	0.5382	1.987089	0.471559	-0.19835	-0.00672
1795	2	14	0.1	1	0.01	150	45	14	1	0	0	7	1.8454	1	0.0029	0	-0.51639	0.785743	-0.30507	-1.32603
1796	2	14	0.01	1	0.1	50	5	14	1	0	0	7	3.1684	0.9986	0.0289	0.5364	-0.48234	0.781957	0.850972	-0.01113
1797	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	7	2.4215	0	0	0	-0.50156	-1.91807	-0.43401	-1.32603
1798	2	10	0.055	3.5	0.055	100	25	9	5	0	0	7	18.6784	0	0	0	-0.08317	-1.91807	-0.43401	-1.32603
1799	0	6	0.055	3.5	0.055	100	25	9	5	0	0	7	1.9215	1	0	1	-0.51443	0.785743	-0.43401	1.125301
1800	0	14	0.055	3.5	0.055	100	25	9	5	0	0	7	1.8379	1	0.0031	0	-0.51658	0.785743	-0.29617	-1.32603
1801	0	10	0.01	3.5	0.055	100	25	9	5	0	0	7	3.4059	0.5046	0.0005	0.9742	-0.47623	-0.55373	-0.41178	1.062056
1802	0	10	0.1	3.5	0.055	100	25	9	5	0	0	7	6.1533	0	0	0	-0.40552	-1.91807	-0.43401	-1.32603
1803	0	10	0.055	1	0.055	100	25	9	5	0	0	7	3.5083	0.8429	0.0001	0.9963	-0.47359	0.360973	-0.42956	1.116231
1804	0	10	0.055	6	0.055	100	25	9	5	0	0	7	3.9138	0.9617	0.0222	0.6283	-0.46316	0.682187	0.55307	0.214142
1805	0	10	0.055	3.5	0.01	100	25	9	5	0	0	7	4.5009	0.8084	0.0001	0.996	-0.44805	0.267692	-0.42956	1.115495
1806	0	10	0.055	3.5	0.1	100	25	9	5	0	0	7	116.3318	0.9694	0.1119	0.0673	2.430092	0.703006	4.541399	-1.16105
1807	0	10	0.055	3.5	0.055	50	25	9	5	0	0	7	2.1852	0.9987	0.046	0.4393	-0.50765	0.782228	1.611289	-0.24916
1808	0	10	0.055	3.5	0.055	150	25	9	5	0	0	7	117.3718	0.9499	0.0046	0.6493	2.456858	0.650282	-0.22948	0.26562
1809	0	10	0.055	3.5	0.055	100	5	9	5	0	0	7	1.2313	1	0	1	-0.5322	0.785743	-0.43401	1.125301
1810	0	10	0.055	3.5	0.055	100	45	9	5	0	0	7	1.6613	1	0.0002	0	-0.52113	0.785743	-0.42512	-1.32603
1811	0	10	0.055	3.5	0.055	100	25	4	5	0	0	7	2.0622	1	0	1	-0.51081	0.785743	-0.43401	1.125301
1812	0	10	0.055	3.5	0.055	100	25	14	5	0	0	7	121.6958	0.9221	0.0148	0.4897	2.568143	0.575116	0.224044	-0.12561
1813	0	10	0.055	3.5	0.055	100	25	9	1	0	0	7	7.4203	0	0	0	-0.37291	-1.91807	-0.43401	-1.32603
1814	0	10	0.055	3.5	0.055	100	25	9	9	0	0	7	4.3235	0	0	0	-0.45261	-1.91807	-0.43401	-1.32603
1815	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	102.2568	0.9685	0.0328	0.2536	2.06785	0.700573	1.024377	-0.70437
1816	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	2.6548	0.4479	0	0.9978	-0.49556	-0.70703	-0.43401	1.119908

1817	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	4.9772	0	0.0028	0	-0.43579	-1.91807	-0.30951	-1.32603
1818	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	109.8967	0	0	0	2.264475	-1.91807	-0.43401	-1.32603
1819	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	3.6195	0.4479	0	0.9978	-0.47073	-0.70703	-0.43401	1.119908
1820	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	3.5298	1	0.0037	0	-0.47304	0.785743	-0.2695	-1.32603
1821	2	6	0.01	6	0.1	50	5	4	1	1	1	7	3.8518	1	0.1109	0	-0.46475	0.785743	4.496936	-1.32603
1822	2	6	0.1	1	0.1	50	45	14	9	1	1	7	2.2118	0.9632	0.0017	0.9353	-0.50696	0.686242	-0.35842	0.9667
1823	2	14	0.01	6	0.1	50	5	14	9	1	1	7	8.254	0	0.0177	0	-0.35146	-1.91807	0.352986	-1.32603
1824	2	14	0.1	1	0.1	150	45	4	9	1	1	7	2.5663	1	0.0064	0	-0.49784	0.785743	-0.14945	-1.32603
1825	2	14	0.01	1	0.1	50	5	4	9	1	1	7	2.6265	0.7145	0	1	-0.49629	0.013803	-0.43401	1.125301
1826	-2	6	0.01	1	0.1	150	5	14	9	1	1	7	2.6219	1	0	1	-0.49641	0.785743	-0.43401	1.125301
1827	2	6	0.1	6	0.1	150	5	14	9	1	1	7	5.7441	0.1532	0.0012	0.3396	-0.41605	-1.50385	-0.38065	-0.49356
1828	2	14	0.1	6	0.1	150	5	4	1	1	1	7	3.9568	1	0	1	-0.46205	0.785743	-0.43401	1.125301
1829	2	6	0.01	6	0.01	50	45	4	9	1	1	7	2.8058	1	0	1	-0.49167	0.785743	-0.43401	1.125301
1830	2	6	0.01	6	0.01	150	5	14	1	1	1	7	106.9136	0.9152	0.0072	0.6474	2.1877	0.556459	-0.11387	0.260963
1831	-2	14	0.01	1	0.1	150	5	4	1	1	1	7	115.0941	0.9551	0.0052	0.6343	2.398238	0.664341	-0.2028	0.22885
1832	-2	6	0.1	1	0.01	50	5	14	1	1	1	7	6.7299	0.1234	0.0014	0.2685	-0.39068	-1.58442	-0.37176	-0.66785
1833	-2	14	0.1	1	0.1	50	5	14	9	1	1	7	3.9877	0.6218	0.0017	0.6016	-0.46126	-0.23684	-0.35842	0.148692
1834	2	14	0.1	6	0.01	150	45	4	9	1	1	7	1.7534	0.9526	0.0857	0.1153	-0.51876	0.657582	3.376469	-1.04339
1835	-2	6	0.01	6	0.01	150	45	14	9	1	1	7	20.7547	0	0	0	-0.02973	-1.91807	-0.43401	-1.32603
1836	2	14	0.01	1	0.01	150	45	4	1	1	1	7	3.456	1	0.0037	0	-0.47494	0.785743	-0.2695	-1.32603
1837	-2	14	0.01	6	0.01	150	45	14	1	1	1	7	5.9011	0.3362	0.0028	0.3278	-0.41201	-1.00905	-0.30951	-0.52248
1838	2	14	0.01	6	0.1	150	45	14	1	1	1	7	2.2998	0.9574	0.0556	0.1665	-0.5047	0.67056	2.038133	-0.91788
1839	2	6	0.1	1	0.01	50	5	4	1	1	1	7	108.614	0.9173	0.0059	0.6945	2.231463	0.562137	-0.17168	0.37642
1840	-2	6	0.1	1	0.01	150	45	4	9	1	1	7	98.8166	0.9656	0.0845	0.0841	1.979311	0.692732	3.323113	-1.11987
1841	-2	6	0.1	1	0.1	150	5	4	1	1	1	7	6.4621	0.9428	0.0017	0.9539	-0.39757	0.631085	-0.35842	1.012294
1842	2	6	0.01	6	0.01	150	5	4	9	1	1	7	5.0921	0.9681	0.0255	0.6066	-0.43283	0.699491	0.699798	0.160949
1843	2	14	0.01	1	0.01	150	5	14	9	1	1	7	2.6585	0.8596	0.0005	0.9745	-0.49546	0.406127	-0.41178	1.062792
1844	-2	6	0.01	1	0.1	150	45	14	1	1	1	7	1.8308	0.7971	0.0039	0.6322	-0.51677	0.237139	-0.2606	0.223703
1845	-2	14	0.01	1	0.01	150	45	4	9	1	1	7	128.7538	0	0	0	2.749791	-1.91807	-0.43401	-1.32603
1846	-2	6	0.01	6	0.1	150	45	4	9	1	1	7	3.7682	0.9844	0.0308	0.5695	-0.46691	0.743563	0.935451	0.070004
1847	2	6	0.01	1	0.01	50	5	14	9	1	1	7	3.0529	1	0	1	-0.48531	0.785743	-0.43401	1.125301
1848	-2	6	0.1	6	0.1	150	45	14	9	1	1	7	4.8215	0.7652	0.0075	0.8148	-0.4398	0.150887	-0.10054	0.671315
1849	-2	14	0.1	1	0.01	50	5	4	1	1	1	7	2.4489	1	0	1	-0.50086	0.785743	-0.43401	1.125301
1850	-2	6	0.1	6	0.01	150	45	4	1	1	1	7	4.5924	0.6218	0.002	0.5585	-0.44569	-0.23684	-0.34508	0.04304
1851	2	14	0.1	1	0.01	50	45	4	9	1	1	7	1.8845	0.8846	0.0111	0.4326	-0.51539	0.473722	0.059531	-0.26558
1852	-2	14	0.1	6	0.01	50	45	14	9	1	1	7	2.2712	0.9452	0.0017	0.9337	-0.50543	0.637574	-0.35842	0.962778
1853	-2	14	0.1	6	0.1	50	5	14	1	1	1	7	2.0589	1	0.0062	0	-0.5109	0.785743	-0.15834	-1.32603
1854	2	6	0.01	1	0.01	50	45	14	1	1	1	7	3.1668	0	0	0	-0.48238	-1.91807	-0.43401	-1.32603
1855	2	6	0.1	6	0.1	150	45	4	1	1	1	7	5.8	0	0	0	-0.41461	-1.91807	-0.43401	-1.32603
1856	-2	14	0.1	6	0.01	150	5	14	9	1	1	7	2.9697	0.8633	0.0005	0.9788	-0.48746	0.416131	-0.41178	1.073333
1857	-2	14	0.01	1	0.1	50	45	14	9	1	1	7	2.4298	0.9563	0.0896	0.1075	-0.50135	0.667586	3.549874	-1.06251
1858	-2	14	0.01	6	0.01	50	5	4	9	1	1	7	2.5204	0.9526	0.1231	0.0831	-0.49902	0.657582	5.039384	-1.12232
1859	2	14	0.1	6	0.1	50	45	4	1	1	1	7	2.3366	0.9631	0.0021	0.9226	-0.50375	0.685972	-0.34064	0.935568
1860	-2	6	0.01	6	0.1	50	45	14	1	1	1	7	25.6928	1	0	1	0.097358	0.785743	-0.43401	1.125301
1861	-2	6	0.1	1	0.1	50	45	4	1	1	1	7	2.1426	0.9548	0.0824	0.1123	-0.50874	0.66353	3.229741	-1.05074
1862	2	14	0.1	6	0.01	50	5	14	1	1	1	7	2.6472	1	0.051	0	-0.49576	0.785743	1.833604	-1.32603
1863	-2	6	0.01	1	0.01	50	5	4	1	1	1	7	4.1366	1	0.0254	0	-0.45742	0.785743	0.695351	-1.32603
1864	-2	6	0.1	6	0.1	50	5	4	9	1	1	7	6.4712	0.8173	0	0.998	-0.39734	0.291756	-0.43401	1.120398
1865	2	14	0.1	1	0.01	150	45	14	1	1	1	7	116.6729	0.9762	0.0828	0.1368	2.438871	0.721392	3.247526	-0.99068
1866	2	14	0.01	1	0.1	50	5	14	1	1	1	7	1.9754	0.9632	0.002	0.9274	-0.51305	0.686242	-0.34508	0.947334
1867	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	7	1.7079	1	0	1	-0.51993	0.785743	-0.43401	1.125301
1868	2	10	0.055	3.5	0.055	100	25	9	5	1	1	7	4.7956	0.6059	0.0007	0.8374	-0.44046	-0.27983	-0.40288	0.726715
1869	0	6	0.055	3.5	0.055	100	25	9	5	1	1	7	20.9588	0	0	0	-0.02448	-1.91807	-0.43401	-1.32603
1870	0	14	0.055	3.5	0.055	100	25	9	5	1	1	7	26.4227	0.8742	0.0112	0.4204	0.116143	0.445603	0.063977	-0.29549
1871	0	10	0.01	3.5	0.055	100	25	9	5	1	1	7	17.1094	0.9434	0.0057	0.5988	-0.12355	0.632707	-0.18057	0.141828
1872	0	10	0.1	3.5	0.055	100	25	9	5	1	1	7	105.1418	0.9077	0.003	0.6839	2.1421	0.536181	-0.30062	0.350436
1873	0	10	0.055	1	0.055	100	25	9	5	1	1	7	67.6219	0.9594	0.1786	0.0335	1.176468	0.675968	7.507079	-1.24391
1874	0	10	0.055	6	0.055	100	25	9	5	1	1	7	1.2341	1	0	1	-0.53212	0.785743	-0.43401	1.125301
1875	0	10	0.055	3.5	0.01	100	25	9	5	1	1	7	3.6851	0.9986	0.0275	0.5464	-0.46904	0.781957	0.788724	0.013379
1876	0	10	0.055	3.5	0.1	100	25	9	5	1	1	7	3.701	1	0.0012	0	-0.46863	0.785743	-0.38065	-1.32603
1877	0	10	0.055	3.5	0.055	50	25	9	5	1	1	7	4.1842	0	0.0014	0	-0.4562	-1.91807	-0.37176	-1.32603
1878	0	10	0.055	3.5	0.055	150	25	9	5	1	1	7	9.9783	0	0	0	-0.30708	-1.91807	-0.43401	-1.32603
1879	0	10	0.055	3.5	0.055	100	5	9	5	1	1	7	3.6024	0.8473	0.0001	0.9964	-0.47117	0.37287	-0.42956	1.116476
1880	0	10	0.055	3.5	0.055	100	45	9	5	1	1	7	3.2436	0.9217	0.0022	0.9381	-0.48041	0.574034	-0.33619	0.973564
1881	0	10	0.055	3.5	0.055	100	25	4	5	1	1	7	19.363	0	0	0	-0.06555	-1.91807	-0.43401	-1.32603
1882	0	10	0.055	3.5	0.055	100	25	14	5	1	1	7	3.9663	1	0.0014	0	-0.46181	0.785743	-0.37176	-1.32603
1883	0	10	0.055	3.5	0.055	100	25	9	1	1	1	7	106.5106	0.9163	0.008	0.6253	2.177328	0.559433	-0.0783	0.206788
1884	0	10	0.055	3.5	0.055	100	25	9	9	1	1	7	3.0852	0.9561	0.0056	0.8669	-0.48448	0.667045	-0.18502	0.799029
1885	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	31.007	0	0	0	0.234127	-1.91807	-0.43401	-1.32603
1886	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	4.1693	0.6218	0.0017	0.6016	-0.45658	-0.23684	-0.35842	0.148692
1887	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	114.0617	0.911	0.0118	0.3561	2.371668	0.545103	0.090655	-0.45311
1888	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	4.7122	0.8696	0.0044	0.5072	-0.44261	0.433165	-0.23837	-0.08271

1889	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	2.8319	0.782	0.0037	0.6341	-0.491	0.196311	-0.2695	0.22836
1890	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	2.4469	0.951	0.0017	0.9406	-0.50091	0.653256	-0.35842	0.979692
1891	2	6	0.01	6	0.1	50	5	4	1	0	1	7	6.3624	0.3362	0.0028	0.3278	-0.40014	-1.00905	-0.30951	-0.52248
1892	2	6	0.1	1	0.1	50	45	14	9	0	1	7	2.7157	1	0	1	-0.49399	0.785743	-0.43401	1.125301
1893	2	14	0.01	6	0.1	50	5	14	9	0	1	7	1.8055	1	0	1	-0.51742	0.785743	-0.43401	1.125301
1894	2	14	0.1	1	0.1	150	45	4	9	0	1	7	14.3153	0	0	0	-0.19546	-1.91807	-0.43401	-1.32603
1895	2	14	0.01	1	0.1	50	5	4	9	0	1	7	4.0258	0.8825	0.0018	0.9483	-0.46028	0.468044	-0.35397	0.998567
1896	-2	6	0.01	1	0.1	150	5	14	9	0	1	7	63.6376	0.913	0.1187	0.0443	1.073926	0.550511	4.843747	-1.21743
1897	2	6	0.1	6	0.1	150	5	14	9	0	1	7	119.5283	0.9102	0.0026	0.7119	2.512359	0.54294	-0.3184	0.419073
1898	2	14	0.1	6	0.1	150	5	4	1	0	1	7	6.0089	0.8385	0.002	0.6853	-0.40924	0.349077	-0.34508	0.353868
1899	2	6	0.01	6	0.01	50	45	4	9	0	1	7	2.0892	0.963	0.0017	0.9366	-0.51012	0.685702	-0.35842	0.969887
1900	2	6	0.01	6	0.01	150	5	14	1	0	1	7	122.8998	0.9578	0.0033	0.7479	2.59913	0.671642	-0.28728	0.507321
1901	-2	14	0.01	1	0.1	150	5	4	1	0	1	7	4.6534	0.6218	0.002	0.5585	-0.44412	-0.23684	-0.34508	0.04304
1902	-2	6	0.1	1	0.01	50	5	14	1	0	1	7	7.8132	0.017	0.0144	0.0048	-0.3628	-1.87211	0.206259	-1.31426
1903	-2	14	0.1	1	0.1	50	5	14	9	0	1	7	5.2582	0.0705	0.0008	0.7474	-0.42856	-1.72745	-0.39844	0.506095
1904	2	14	0.1	6	0.01	150	45	4	9	0	1	7	2.6182	0.98	0.031	0.5635	-0.4965	0.731666	0.944344	0.055296
1905	-2	6	0.01	6	0.01	150	45	14	9	0	1	7	3.4128	1	0.0049	0	-0.47605	0.785743	-0.21614	-1.32603
1906	2	14	0.01	1	0.01	150	45	4	1	0	1	7	115.5805	0.9695	0.0887	0.0837	2.410756	0.703276	3.509858	-1.12085
1907	-2	14	0.01	6	0.01	150	45	14	1	0	1	7	4.1969	0.9074	0.0007	0.9826	-0.45587	0.535369	-0.40288	1.082648
1908	2	14	0.01	6	0.1	150	45	14	1	0	1	7	3.4901	0.8483	0.0003	0.9894	-0.47406	0.375574	-0.42067	1.099317
1909	2	6	0.1	1	0.01	50	5	4	1	0	1	7	9.9933	0	0	0	-0.30669	-1.91807	-0.43401	-1.32603
1910	-2	6	0.1	1	0.01	150	45	4	9	0	1	7	6.4086	0.7976	0.0019	0.648	-0.39895	0.238491	-0.34953	0.262434
1911	-2	6	0.1	1	0.1	150	5	4	1	0	1	7	5.5279	0	0	0	-0.42162	-1.91807	-0.43401	-1.32603
1912	2	6	0.01	6	0.01	150	5	4	9	0	1	7	90.7615	0	0	0	1.772001	-1.91807	-0.43401	-1.32603
1913	2	14	0.01	1	0.01	150	5	14	9	0	1	7	1.7216	0.8839	0.0058	0.5931	-0.51958	0.47183	-0.17612	0.127856
1914	-2	6	0.01	1	0.1	150	45	14	1	0	1	7	2.7944	0.8133	0.0106	0.2948	-0.49197	0.28094	0.037299	-0.60338
1915	-2	14	0.01	1	0.01	150	45	4	9	0	1	7	3.7895	0.4592	0.0018	0.903	-0.46636	-0.67648	-0.35397	0.887522
1916	-2	6	0.01	6	0.1	150	45	4	9	0	1	7	3.4583	0.9664	0.0075	0.8313	-0.47488	0.694895	-0.10054	0.711762
1917	2	6	0.01	1	0.01	50	5	14	9	0	1	7	1.25	1	0	1	-0.53171	0.785743	-0.43401	1.125301
1918	-2	6	0.1	6	0.1	150	45	14	9	0	1	7	4.6875	0	0.0028	0	-0.44325	-1.91807	-0.30951	-1.32603
1919	-2	14	0.1	1	0.01	50	5	4	1	0	1	7	4.9312	0	0	0	-0.43697	-1.91807	-0.43401	-1.32603
1920	-2	6	0.1	6	0.01	150	45	4	1	0	1	7	65.3278	0.7922	0.0014	0.7394	1.117426	0.22389	-0.37176	0.486485
1921	2	14	0.1	1	0.01	50	45	4	9	0	1	7	3.9627	0.4681	0.0018	0.9026	-0.4619	-0.65242	-0.35397	0.886541
1922	-2	14	0.1	6	0.01	50	45	14	9	0	1	7	1.5044	1	0	1	-0.52517	0.785743	-0.43401	1.125301
1923	-2	14	0.1	6	0.1	50	5	14	1	0	1	7	114.8515	0.8845	0.0042	0.5939	2.391994	0.473452	-0.24726	0.129817
1924	2	6	0.01	1	0.01	50	45	14	1	0	1	7	2.9458	0.9801	0.0386	0.5106	-0.48807	0.731937	1.282263	-0.07438
1925	2	6	0.1	6	0.1	150	45	4	1	0	1	7	2.5138	1	0	1	-0.49919	0.785743	-0.43401	1.125301
1926	-2	14	0.1	6	0.01	150	5	14	9	0	1	7	4.6616	1	0.006	0	-0.44391	0.785743	-0.16723	-1.32603
1927	-2	14	0.01	1	0.1	50	45	14	9	0	1	7	5.4773	0	0.0174	0	-0.42292	-1.91807	0.339648	-1.32603
1928	-2	14	0.01	6	0.01	50	5	4	9	0	1	7	5.4272	0.9643	0.0093	0.8211	-0.42421	0.689217	-0.0205	0.686758
1929	2	14	0.1	6	0.1	50	45	4	1	0	1	7	5.0283	0	0.0064	0	-0.43447	-1.91807	-0.14945	-1.32603
1930	-2	6	0.01	6	0.1	50	45	14	1	0	1	7	2.7048	1	0.0744	0.3465	-0.49427	0.785743	2.874037	-0.47664
1931	-2	6	0.1	1	0.1	50	45	4	1	0	1	7	1.2195	1	0	1	-0.5325	0.785743	-0.43401	1.125301
1932	2	14	0.1	6	0.01	50	5	14	1	0	1	7	3.5496	0.6218	0.0022	0.5362	-0.47253	-0.23684	-0.33619	-0.01162
1933	-2	6	0.01	1	0.01	50	5	4	1	0	1	7	5.5685	0.8571	0.0049	0.4792	-0.42057	0.399368	-0.21614	-0.15135
1934	-2	6	0.1	6	0.1	50	5	4	9	0	1	7	3.8627	0.8413	0.0001	0.9964	-0.46447	0.356647	-0.42956	1.116476
1935	2	14	0.1	1	0.01	150	45	14	1	0	1	7	2.1027	1	0	1	-0.50977	0.785743	-0.43401	1.125301
1936	2	14	0.01	1	0.1	50	5	14	1	0	1	7	1.4105	1	0	1	-0.52758	0.785743	-0.43401	1.125301
1937	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	7	1.5334	1	0	1	-0.52442	0.785743	-0.43401	1.125301
1938	2	10	0.055	3.5	0.055	100	25	9	5	0	1	7	18.8934	0	0	0	-0.07763	-1.91807	-0.43401	-1.32603
1939	0	6	0.055	3.5	0.055	100	25	9	5	0	1	7	1.3861	1	0	1	-0.52821	0.785743	-0.43401	1.125301
1940	0	14	0.055	3.5	0.055	100	25	9	5	0	1	7	2.6682	1	0.0391	0	-0.49522	0.785743	1.304494	-1.32603
1941	0	10	0.01	3.5	0.055	100	25	9	5	0	1	7	3.1349	0.6218	0.0019	0.5759	-0.4832	-0.23684	-0.34953	0.085693
1942	0	10	0.1	3.5	0.055	100	25	9	5	0	1	7	7.8621	0	0.0004	0	-0.36154	-1.91807	-0.41622	-1.32603
1943	0	10	0.055	1	0.055	100	25	9	5	0	1	7	123.5875	0.9669	0.0033	0.7512	2.616829	0.696246	-0.28728	0.51541
1944	0	10	0.055	6	0.055	100	25	9	5	0	1	7	2.636	0.9093	0.0005	0.9761	-0.49604	0.540507	-0.41178	1.066714
1945	0	10	0.055	3.5	0.01	100	25	9	5	0	1	7	4.5507	0.4572	0.0001	0.9937	-0.44677	-0.68189	-0.42956	1.109857
1946	0	10	0.055	3.5	0.1	100	25	9	5	0	1	7	18.7858	0	0	0	-0.0804	-1.91807	-0.43401	-1.32603
1947	0	10	0.055	3.5	0.055	50	25	9	5	0	1	7	100.87	0.9307	0.0003	0.9573	2.032159	0.598368	-0.42067	1.020629
1948	0	10	0.055	3.5	0.055	150	25	9	5	0	1	7	6.5765	0.8323	0.0018	0.709	-0.39463	0.332313	-0.35397	0.411964
1949	0	10	0.055	3.5	0.055	100	5	9	5	0	1	7	4.1144	0.6218	0.0019	0.5759	-0.458	-0.23684	-0.34953	0.085693
1950	0	10	0.055	3.5	0.055	100	45	9	5	0	1	7	2.6198	0.8826	0.0018	0.9474	-0.49646	0.468315	-0.35397	0.996361
1951	0	10	0.055	3.5	0.055	100	25	4	5	0	1	7	2.958	1	0	1	-0.48776	0.785743	-0.43401	1.125301
1952	0	10	0.055	3.5	0.055	100	25	14	5	0	1	7	5.3155	0.9428	0.0017	0.9539	-0.42708	0.631085	-0.35842	1.012294
1953	0	10	0.055	3.5	0.055	100	25	9	1	0	1	7	4.3576	0.4949	0	1	-0.45174	-0.57995	-0.43401	1.125301
1954	0	10	0.055	3.5	0.055	100	25	9	9	0	1	7	5.8911	0.3362	0.0028	0.3278	-0.41227	-1.00905	-0.30951	-0.52248
1955	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	111.8357	0	0	0	2.314378	-1.91807	-0.43401	-1.32603
1956	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	4.7413	0.4213	0.0007	0.7122	-0.44186	-0.77896	-0.40288	0.419809
1957	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	2.0873	0.9452	0.0015	0.9436	-0.51017	0.637574	-0.36731	0.987046
1958	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	4.8274	0.709	0.0033	0.474	-0.43965	-0.00107	-0.28728	-0.1641
1959	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	3.959	1	0.0048	0	-0.46199	0.785743	-0.22059	-1.32603
1960	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	19.3982	0	0	0	-0.06464	-1.91807	-0.43401	-1.32603

Table A.7 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 7) in the Crossed Array Design

Crossed Array Inner Array Design Points and Responses (Block 8)

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP	Std Time	Std TPF	Std FPF	Std TFP
1961	2	6	0.01	6	0.1	50	5	4	1	1	0	8	27.6122	0.8758	0.013	0.3873	0.146757	0.449929	0.14401	-0.37663
1962	2	6	0.1	1	0.1	50	45	14	9	1	0	8	2.5583	1	0	1	-0.49804	0.785743	-0.43401	1.125301
1963	2	14	0.01	6	0.1	50	5	14	9	1	0	8	6.0757	0.0894	0.0017	0.175	-0.40752	-1.67635	-0.35842	-0.89704
1964	2	14	0.1	1	0.1	150	45	4	9	1	0	8	122.6073	0.9665	0.0035	0.7376	2.591602	0.695165	-0.27839	0.482072
1965	2	14	0.01	1	0.1	50	5	4	9	1	0	8	4.4399	0.6218	0.002	0.5585	-0.44962	-0.23684	-0.34508	0.04304
1966	-2	6	0.01	1	0.1	150	5	14	9	1	0	8	4.0178	0.8826	0.0018	0.9474	-0.46048	0.468315	-0.35397	0.996361
1967	2	6	0.1	6	0.1	150	5	14	9	1	0	8	9.2121	0	0	0	-0.3268	-1.91807	-0.43401	-1.32603
1968	2	14	0.1	6	0.1	150	5	4	1	1	0	8	2.3487	0.8612	0.0005	0.9745	-0.50344	0.410453	-0.41178	1.062792
1969	2	6	0.01	6	0.01	50	45	4	9	1	0	8	3.4933	1	0.002	0	-0.47398	0.785743	-0.34508	-1.32603
1970	2	6	0.01	6	0.01	150	5	14	1	1	0	8	3.968	0	0.0174	0	-0.46176	-1.91807	0.339648	-1.32603
1971	-2	14	0.01	1	0.1	150	5	4	1	1	0	8	5.0097	0	0	0	-0.43495	-1.91807	-0.43401	-1.32603
1972	-2	6	0.1	1	0.01	50	5	14	1	1	0	8	23.8435	0	0	0	0.049764	-1.91807	-0.43401	-1.32603
1973	-2	14	0.1	1	0.1	50	5	14	9	1	0	8	4.3248	0.8268	0.0289	0.1119	-0.45258	0.317442	0.850972	-1.05172
1974	2	14	0.1	6	0.01	150	45	4	9	1	0	8	3.042	0.4208	0.0009	0.9417	-0.4856	-0.78031	-0.39399	0.982388
1975	-2	6	0.01	6	0.01	150	45	14	9	1	0	8	114.7571	0.9742	0.0322	0.1995	2.389565	0.715984	0.9977	-0.83699
1976	2	14	0.01	1	0.01	150	45	4	1	1	0	8	26.465	0.933	0.1063	0.0883	0.117232	0.604587	4.292406	-1.10957
1977	-2	14	0.01	6	0.01	150	45	14	1	1	0	8	1.2183	1	0	1	-0.53253	0.785743	-0.43401	1.125301
1978	2	14	0.01	6	0.1	150	45	14	1	1	0	8	3.6482	0.8214	0.0118	0.276	-0.46999	0.302841	0.090655	-0.64946
1979	2	6	0.1	1	0.01	50	5	4	1	1	0	8	1.8486	0.9121	0.0007	0.9702	-0.51631	0.548077	-0.40288	1.052251
1980	-2	6	0.1	1	0.01	150	45	4	9	1	0	8	3.2951	0.8422	0	1	-0.47908	0.359081	-0.43401	1.125301
1981	-2	6	0.1	1	0.1	150	5	4	1	1	0	8	1.4786	1	0	1	-0.52583	0.785743	-0.43401	1.125301
1982	2	6	0.01	6	0.01	150	5	4	9	1	0	8	1.8885	0.9928	0.0228	0.5818	-0.51528	0.766275	0.579748	0.100156
1983	2	14	0.01	1	0.01	150	5	14	9	1	0	8	9.6926	0	0	0	-0.31443	-1.91807	-0.43401	-1.32603
1984	-2	6	0.01	1	0.1	150	45	14	1	1	0	8	3.3884	0.6218	0.0022	0.5362	-0.47668	-0.23684	-0.33619	-0.01162
1985	-2	14	0.01	1	0.01	150	45	4	9	1	0	8	11.3077	0	0	0	-0.27286	-1.91807	-0.43401	-1.32603
1986	-2	6	0.01	6	0.1	150	45	4	9	1	0	8	3.8686	1	0.0022	0	-0.46432	0.785743	-0.33619	-1.32603
1987	2	6	0.01	1	0.01	50	5	14	9	1	0	8	2.1193	0.9452	0.0015	0.9436	-0.50934	0.637574	-0.36731	0.987046
1988	-2	6	0.1	6	0.1	150	45	14	9	1	0	8	4.3861	1	0	1	-0.451	0.785743	-0.43401	1.125301
1989	-2	14	0.1	1	0.01	50	5	4	1	1	0	8	3.8672	0.6218	0.0033	0.4405	-0.46436	-0.23684	-0.28728	-0.24622
1990	-2	6	0.1	6	0.01	150	45	4	1	1	0	8	4.4998	0.8385	0.002	0.6888	-0.44808	0.349077	-0.34508	0.362448
1991	2	14	0.1	1	0.01	50	45	4	9	1	0	8	24.6577	1	0	1	0.070718	0.785743	-0.43401	1.125301
1992	-2	14	0.1	6	0.01	50	45	14	9	1	0	8	1.2196	1	0	1	-0.5325	0.785743	-0.43401	1.125301
1993	-2	14	0.1	6	0.1	50	5	14	1	1	0	8	122.6117	0.9541	0.0006	0.9327	2.591715	0.661638	-0.40733	0.960326
1994	2	6	0.01	1	0.01	50	45	14	1	1	0	8	3.6046	0.8826	0.0018	0.9474	-0.47112	0.468315	-0.35397	0.996361
1995	2	6	0.1	6	0.1	150	45	4	1	1	0	8	1.6082	0.8194	0.005	0.59	-0.5225	0.297434	-0.21169	0.120257
1996	-2	14	0.1	6	0.01	150	5	14	9	1	0	8	2.4423	1	0.001	0	-0.50103	0.785743	-0.38955	-1.32603
1997	-2	14	0.01	1	0.1	50	45	14	9	1	0	8	2.1852	1	0	1	-0.50765	0.785743	-0.43401	1.125301
1998	-2	14	0.01	6	0.01	50	5	4	9	1	0	8	72.7543	0.7821	0.0018	0.6854	1.308558	0.196581	-0.35397	0.354113
1999	2	14	0.1	6	0.1	50	45	4	1	1	0	8	1.3998	1	0	1	-0.52786	0.785743	-0.43401	1.125301
2000	-2	6	0.01	6	0.1	50	45	14	1	1	0	8	7.8812	0.8696	0.0174	0.1797	-0.36105	0.433165	0.339648	-0.88552
2001	-2	6	0.1	1	0.1	50	45	4	1	1	0	8	25.7782	1	0	1	0.099556	0.785743	-0.43401	1.125301
2002	2	14	0.1	6	0.01	50	5	14	1	1	0	8	2.3323	1	0	1	-0.50386	0.785743	-0.43401	1.125301
2003	-2	6	0.01	1	0.01	50	5	4	1	1	0	8	126.7987	0.886	0.0008	0.9075	2.699474	0.477508	-0.39844	0.898553
2004	-2	6	0.1	6	0.1	50	5	4	9	1	0	8	2.5855	0.9928	0.031	0.507	-0.49734	0.766275	0.944344	-0.0832
2005	2	14	0.1	1	0.01	150	45	14	1	1	0	8	27.7706	0.8774	0.0188	0.3077	0.150833	0.454255	0.401896	-0.57175
2006	2	14	0.01	1	0.1	50	5	14	1	1	0	8	4.6886	0.8368	0.002	0.7227	-0.44322	0.34448	-0.34508	0.445548
2007	-2	10	0.055	3.5	0.055	100	25	9	5	1	0	8	1.898	0.8839	0.0268	0.2395	-0.51504	0.47183	0.757599	-0.73893
2008	2	10	0.055	3.5	0.055	100	25	9	5	1	0	8	9.1149	0	0.0004	0	-0.3293	-1.91807	-0.41622	-1.32603
2009	0	6	0.055	3.5	0.055	100	25	9	5	1	0	8	2.7271	0.4309	0.0012	0.9277	-0.4937	-0.753	-0.38065	0.94807
2010	0	14	0.055	3.5	0.055	100	25	9	5	1	0	8	1.1803	1	0	1	-0.53351	0.785743	-0.43401	1.125301
2011	0	10	0.01	3.5	0.055	100	25	9	5	1	0	8	2.677	0.8876	0.0315	0.1346	-0.49499	0.481834	0.966575	-0.99608
2012	0	10	0.1	3.5	0.055	100	25	9	5	1	0	8	2.5201	0.8962	0.0871	0.058	-0.49903	0.505087	3.438717	-1.18385
2013	0	10	0.055	1	0.055	100	25	9	5	1	0	8	1.8173	1	0	1	-0.51711	0.785743	-0.43401	1.125301
2014	0	10	0.055	6	0.055	100	25	9	5	1	0	8	4.4367	1	0.0038	0	-0.4497	0.785743	-0.26505	-1.32603
2015	0	10	0.055	3.5	0.01	100	25	9	5	1	0	8	4.0532	0.4538	0.0009	0.9439	-0.45957	-0.69108	-0.39399	0.987781
2016	0	10	0.055	3.5	0.1	100	25	9	5	1	0	8	1.9018	0.9574	0.1223	0.0833	-0.51494	0.67056	5.003814	-1.12183
2017	0	10	0.055	3.5	0.055	50	25	9	5	1	0	8	4.9158	0.2681	0.002	0.358	-0.43737	-1.19318	-0.34508	-0.44845
2018	0	10	0.055	3.5	0.055	150	25	9	5	1	0	8	121.5354	0.928	0.0139	0.4985	2.564015	0.591068	0.184027	-0.10404
2019	0	10	0.055	3.5	0.055	100	5	9	5	1	0	8	117.5571	0.9485	0.0007	0.9247	2.461627	0.646496	-0.40288	0.940716
2020	0	10	0.055	3.5	0.055	100	45	9	5	1	0	8	9.4202	0.017	0.0144	0.0048	-0.32144	-1.87211	0.206259	-1.31426
2021	0	10	0.055	3.5	0.055	100	25	4	5	1	0	8	2.8718	0.6078	0.0059	0.7897	-0.48998	-0.27469	-0.17168	0.609787
2022	0	10	0.055	3.5	0.055	100	25	14	5	1	0	8	4.5474	0.6542	0.0017	0.6157	-0.44685	-0.14924	-0.35842	0.183256
2023	0	10	0.055	3.5	0.055	100	25	9	1	1	0	8	119.9014	0.9167	0.0043	0.6051	2.521961	0.560515	-0.24282	0.157272
2024	0	10	0.055	3.5	0.055	100	25	9	9	1	0	8	25.6977	1	0	1	0.097484	0.785743	-0.43401	1.125301

2025	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	1.8544	1	0	1	-0.51616	0.785743	-0.43401	1.125301
2026	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	164.4733	0	0	0	3.669088	-1.91807	-0.43401	-1.32603
2027	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	2.2192	0.9468	0.0577	0.1598	-0.50677	0.6419	2.131505	-0.9343
2028	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	35.6694	1	0.0057	0	0.354121	0.785743	-0.18057	-1.32603
2029	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	3.9572	0	0	0	-0.46204	-1.91807	-0.43401	-1.32603
2030	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	4.6703	0.9428	0.0017	0.9539	-0.44369	0.631085	-0.35842	1.012294
2031	2	6	0.01	6	0.1	50	5	4	1	0	0	8	38.5002	1	0	1	0.426976	0.785743	-0.43401	1.125301
2032	2	6	0.1	1	0.1	50	45	14	9	0	0	8	4.9625	0	0	0	-0.43617	-1.91807	-0.43401	-1.32603
2033	2	14	0.01	6	0.1	50	5	14	9	0	0	8	1.7296	0.8125	0.0032	0.6923	-0.51937	0.278777	-0.29173	0.371027
2034	2	14	0.1	1	0.1	150	45	4	9	0	0	8	114.7766	0.9434	0.0034	0.6938	2.390067	0.632707	-0.28283	0.374704
2035	2	14	0.01	1	0.1	50	5	4	9	0	0	8	4.6839	0.8385	0.0018	0.7068	-0.44334	0.349077	-0.35397	0.406572
2036	-2	6	0.01	1	0.1	150	5	14	9	0	0	8	65.4577	0.9444	0.0492	0.1016	1.120769	0.635411	1.75357	-1.07697
2037	2	6	0.1	6	0.1	150	5	14	9	0	0	8	2.0654	1	0	1	-0.51073	0.785743	-0.43401	1.125301
2038	2	14	0.1	6	0.1	150	5	4	1	0	0	8	5.6434	0.984	0.024	0.6469	-0.41864	0.742482	0.633103	0.259737
2039	2	6	0.01	6	0.01	50	45	4	9	0	0	8	3.3774	0.8439	0.0003	0.9891	-0.47696	0.363677	-0.42067	1.098581
2040	2	6	0.01	6	0.01	150	5	14	1	0	0	8	68.1893	0	0	0	1.191071	-1.91807	-0.43401	-1.32603
2041	-2	14	0.01	1	0.1	150	5	4	1	0	0	8	100.9635	0.8673	0.0008	0.8809	2.034565	0.426946	-0.39844	0.833348
2042	-2	6	0.1	1	0.01	50	5	14	1	0	0	8	66.5218	0.8	0.0046	0.4662	1.148155	0.24498	-0.22948	-0.18322
2043	-2	14	0.1	1	0.1	50	5	14	9	0	0	8	111.8718	0.9042	0.0035	0.6467	2.315307	0.526717	-0.27839	0.259247
2044	2	14	0.1	6	0.01	150	45	4	9	0	0	8	2.7772	0.6959	0.0016	0.6776	-0.49241	-0.03649	-0.36287	0.334993
2045	-2	6	0.01	6	0.01	150	45	14	9	0	0	8	9.423	0	0	0	-0.32137	-1.91807	-0.43401	-1.32603
2046	2	14	0.01	1	0.01	150	45	4	1	0	0	8	9.6024	0	0	0	-0.31675	-1.91807	-0.43401	-1.32603
2047	-2	14	0.01	6	0.01	150	45	14	1	0	0	8	4.2574	0	0	0	-0.45431	-1.91807	-0.43401	-1.32603
2048	2	14	0.01	6	0.1	150	45	14	1	0	0	8	2.5155	0.8889	0.0008	0.9652	-0.49915	0.485349	-0.39844	1.039994
2049	2	6	0.1	1	0.01	50	5	4	1	0	0	8	5.9946	0.8122	0.0059	0.8608	-0.40961	0.277966	-0.17168	0.784076
2050	-2	6	0.1	1	0.01	150	45	4	9	0	0	8	2.9154	0.9389	0.0014	0.9472	-0.48885	0.62054	-0.37176	0.995871
2051	-2	6	0.1	1	0.1	150	5	4	1	0	0	8	12.1301	0	0	0	-0.2517	-1.91807	-0.43401	-1.32603
2052	2	6	0.01	6	0.01	150	5	4	9	0	0	8	3.9463	0.4847	0.0001	0.9634	-0.46232	-0.60753	-0.42956	1.035582
2053	2	14	0.01	1	0.01	150	5	14	9	0	0	8	2.5369	0.8663	0.0309	0.1364	-0.49859	0.424243	0.939898	-0.99167
2054	-2	6	0.01	1	0.1	150	45	14	1	0	0	8	3.4389	0.9093	0.0006	0.9723	-0.47538	0.540507	-0.40733	1.057399
2055	-2	14	0.01	1	0.01	150	45	4	9	0	0	8	4.0069	1	0.0074	0	-0.46076	0.785743	-0.10498	-1.32603
2056	-2	6	0.01	6	0.1	150	45	4	9	0	0	8	7.7083	0.8571	0.0038	0.5412	-0.3655	0.399368	-0.26505	0.000632
2057	2	6	0.01	1	0.01	50	5	14	9	0	0	8	97.1645	0.8831	0.0011	0.8491	1.936792	0.469667	-0.3851	0.755395
2058	-2	6	0.1	6	0.1	150	45	14	9	0	0	8	1.9614	0.8194	0.0043	0.6277	-0.51341	0.297434	-0.24282	0.212672
2059	-2	14	0.1	1	0.01	50	5	4	1	0	0	8	4.3455	0	0	0	-0.45205	-1.91807	-0.43401	-1.32603
2060	-2	6	0.1	6	0.01	150	45	4	1	0	0	8	114.7814	0.9702	0.0903	0.0843	2.39019	0.705169	3.580999	-1.11938
2061	2	14	0.1	1	0.01	50	45	4	9	0	0	8	4.6235	0.5208	0.0047	0.4934	-0.44489	-0.50993	-0.22503	-0.11654
2062	-2	14	0.1	6	0.01	50	45	14	9	0	0	8	27.7709	0.7456	0.0033	0.7039	0.150841	0.097892	-0.28728	0.399463
2063	-2	14	0.1	6	0.1	50	5	14	1	0	0	8	1.6417	1	0	1	-0.52163	0.785743	-0.43401	1.125301
2064	2	6	0.01	1	0.01	50	45	14	1	0	0	8	113.929	0.8886	0.0072	0.466	2.368252	0.484538	-0.11387	-0.18371
2065	2	6	0.1	6	0.1	150	45	4	1	0	0	8	1.2445	1	0	1	-0.53186	0.785743	-0.43401	1.125301
2066	-2	14	0.1	6	0.01	150	5	14	9	0	0	8	122.4207	0	0	0	2.586799	-1.91807	-0.43401	-1.32603
2067	-2	14	0.01	1	0.1	50	45	14	9	0	0	8	114.8529	0.8906	0.0062	0.4991	2.39203	0.489945	-0.15834	-0.10257
2068	-2	14	0.01	6	0.01	50	5	4	9	0	0	8	26.4813	0.8758	0.0164	0.335	0.117651	0.449929	0.295185	-0.50483
2069	2	14	0.1	6	0.1	50	45	4	1	0	0	8	116.815	0.9349	0.0018	0.8086	2.442528	0.609724	-0.35397	0.656117
2070	-2	6	0.01	6	0.1	50	45	14	1	0	0	8	26.5215	0.8758	0.0163	0.3358	0.118686	0.449929	0.290738	-0.50287
2071	-2	6	0.1	1	0.1	50	45	4	1	0	0	8	2.6748	1	0.0064	0	-0.49505	0.785743	-0.14945	-1.32603
2072	2	14	0.1	6	0.01	50	5	14	1	0	0	8	1.8075	0.9551	0.1141	0.0841	-0.51737	0.664341	4.639217	-1.11987
2073	-2	6	0.01	1	0.01	50	5	4	1	0	0	8	162.6023	0	0	0	3.620934	-1.91807	-0.43401	-1.32603
2074	-2	6	0.1	6	0.1	50	5	4	9	0	0	8	116.9653	0.9669	0.0029	0.735	2.446396	0.696246	-0.30507	0.475699
2075	2	14	0.1	1	0.01	150	45	14	1	0	0	8	3.8347	0.6218	0.0017	0.6016	-0.46519	-0.23684	-0.35842	0.148692
2076	2	14	0.01	1	0.1	50	5	14	1	0	0	8	2.2108	1	0	1	-0.50699	0.785743	-0.43401	1.125301
2077	-2	10	0.055	3.5	0.055	100	25	9	5	0	0	8	121.6957	0	0	0	2.56814	-1.91807	-0.43401	-1.32603
2078	2	10	0.055	3.5	0.055	100	25	9	5	0	0	8	2.6468	0	0	0	-0.49577	-1.91807	-0.43401	-1.32603
2079	0	6	0.055	3.5	0.055	100	25	9	5	0	0	8	2.1061	1	0	1	-0.50968	0.785743	-0.43401	1.125301
2080	0	14	0.055	3.5	0.055	100	25	9	5	0	0	8	1.8634	0.9631	0.0019	0.9304	-0.51593	0.685972	-0.34953	0.954688
2081	0	10	0.01	3.5	0.055	100	25	9	5	0	0	8	1.9332	0.8846	0.0111	0.4326	-0.51413	0.473722	0.059531	-0.26558
2082	0	10	0.1	3.5	0.055	100	25	9	5	0	0	8	4.7326	0	0	0	-0.44208	-1.91807	-0.43401	-1.32603
2083	0	10	0.055	1	0.055	100	25	9	5	0	0	8	161.4533	0	0	0	3.591363	-1.91807	-0.43401	-1.32603
2084	0	10	0.055	6	0.055	100	25	9	5	0	0	8	1.7085	1	0	1	-0.51991	0.785743	-0.43401	1.125301
2085	0	10	0.055	3.5	0.01	100	25	9	5	0	0	8	4.7936	0	0.0165	0	-0.44051	-1.91807	0.299631	-1.32603
2086	0	10	0.055	3.5	0.1	100	25	9	5	0	0	8	2.2452	1	0	1	-0.5061	0.785743	-0.43401	1.125301
2087	0	10	0.055	3.5	0.055	50	25	9	5	0	0	8	90.9264	0.8829	0.0007	0.9018	1.776245	0.469126	-0.40288	0.88458
2088	0	10	0.055	3.5	0.055	150	25	9	5	0	0	8	5.6802	0.017	0.0144	0.0048	-0.4177	-1.87211	0.206259	-1.31426
2089	0	10	0.055	3.5	0.055	100	5	9	5	0	0	8	6.877	0.3362	0.0042	0.2446	-0.3869	-1.00905	-0.24726	-0.72643
2090	0	10	0.055	3.5	0.055	100	45	9	5	0	0	8	3.6256	0.8496	0.0007	0.9741	-0.47058	0.379089	-0.40288	1.061811
2091	0	10	0.055	3.5	0.055	100	25	4	5	0	0	8	5.4684	0.8329	0.0209	0.6709	-0.42315	0.333935	0.495268	0.318569
2092	0	10	0.055	3.5	0.055	100	25	14	5	0	0	8	2.9821	0.9006	0.0986	0.0513	-0.48714	0.516984	3.950041	-1.20027
2093	0	10	0.055	3.5	0.055	100	25	9	1	0	0	8	114.782	0	0	0	2.390206	-1.91807	-0.43401	-1.32603
2094	0	10	0.055	3.5	0.055	100	25	9	9	0	0	8	2.1941	0.9632	0.002	0.9274	-0.50742	0.686242	-0.34508	0.947334
2095	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	19.9839	0	0	0	-0.04957	-1.91807	-0.43401	-1.32603
2096	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	4.3348	0	0	0	-0.45232	-1.91807	-0.43401	-1.32603

2097	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	2.2744	0.9855	0.0305	0.5078	-0.50535	0.746537	0.922113	-0.08124
2098	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	3.3697	0.5203	0.0003	0.939	-0.47716	-0.51128	-0.42067	0.97577
2099	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	2.9233	1	0.1611	0	-0.48865	0.785743	6.728977	-1.32603
2100	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	6.3638	0	0	0	-0.4001	-1.91807	-0.43401	-1.32603
2101	2	6	0.01	6	0.1	50	5	4	1	1	1	8	3.266	0.9326	0.0006	0.9854	-0.47983	0.603506	-0.40733	1.089511
2102	2	6	0.1	1	0.1	50	45	14	9	1	1	8	4.8769	0.8696	0.0044	0.5072	-0.43837	0.433165	-0.23837	-0.08271
2103	2	14	0.01	6	0.1	50	5	14	9	1	1	8	1.1744	1	0.0013	0	-0.53366	0.785743	-0.37621	-1.32603
2104	2	14	0.1	1	0.1	150	45	4	9	1	1	8	1.2637	1	0	1	-0.53136	0.785743	-0.43401	1.125301
2105	2	14	0.01	1	0.1	50	5	4	9	1	1	8	26.3429	1	0	1	0.114089	0.785743	-0.43401	1.125301
2106	-2	6	0.01	1	0.1	150	5	14	9	1	1	8	1.2005	1	0	1	-0.53299	0.785743	-0.43401	1.125301
2107	2	6	0.1	6	0.1	150	5	14	9	1	1	8	5.1461	0.7892	0.0003	0.9481	-0.43144	0.215778	-0.42067	0.998077
2108	2	14	0.1	6	0.1	150	5	4	1	1	1	8	103.3234	0	0	0	2.095301	-1.91807	-0.43401	-1.32603
2109	2	6	0.01	6	0.01	50	45	4	9	1	1	8	2.6473	0.9927	0.0226	0.5824	-0.49575	0.766005	0.570855	0.101626
2110	2	6	0.01	6	0.01	150	5	14	1	1	1	8	4.53	1	0	1	-0.4473	0.785743	-0.43401	1.125301
2111	-2	14	0.01	1	0.1	150	5	4	1	1	1	8	2.4985	0.782	0.0049	0.5652	-0.49958	0.196311	-0.21614	0.059464
2112	-2	6	0.1	1	0.01	50	5	14	1	1	1	8	119.6259	0.9102	0.0025	0.717	2.514871	0.54294	-0.32285	0.431575
2113	-2	14	0.1	1	0.1	50	5	14	9	1	1	8	1.7333	0.9148	0.0009	0.963	-0.51928	0.555378	-0.39399	1.034602
2114	2	14	0.1	6	0.01	150	45	4	9	1	1	8	4.1468	0.8405	0.0293	0.1133	-0.45716	0.354484	0.868757	-1.04829
2115	-2	6	0.01	6	0.01	150	45	14	9	1	1	8	4.2206	0	0.0017	0	-0.45526	-1.91807	-0.35842	-1.32603
2116	2	14	0.01	1	0.01	150	45	4	1	1	1	8	122.8044	0.9539	0.0005	0.9402	2.596674	0.661097	-0.41178	0.978711
2117	-2	14	0.01	6	0.01	150	45	14	1	1	1	8	3.2452	0.8424	0	1	-0.48037	0.359621	-0.43401	1.125301
2118	2	14	0.01	6	0.1	150	45	14	1	1	1	8	2.8709	0.4518	0	0.9979	-0.49	-0.69649	-0.43401	1.120153
2119	2	6	0.1	1	0.01	50	5	4	1	1	1	8	1.4699	1	0	1	-0.52606	0.785743	-0.43401	1.125301
2120	-2	6	0.1	1	0.01	150	45	4	9	1	1	8	59.7558	0.927	0.0685	0.0731	0.974022	0.588364	2.611706	-1.14683
2121	-2	6	0.1	1	0.1	150	5	4	1	1	1	8	3.6465	1	0.0044	0	-0.47004	0.785743	-0.23837	-1.32603
2122	2	6	0.01	6	0.01	150	5	4	9	1	1	8	27.5542	0.7882	0.0078	0.5575	0.145264	0.213075	-0.0872	0.040588
2123	2	14	0.01	1	0.01	150	5	14	9	1	1	8	115.9663	0.9697	0.0882	0.0848	2.420685	0.703817	3.487626	-1.11815
2124	-2	6	0.01	1	0.1	150	45	14	1	1	1	8	1.5732	0.8933	0.0006	0.9715	-0.5234	0.497246	-0.40733	1.055438
2125	-2	14	0.01	1	0.01	150	45	4	9	1	1	8	5.737	0.9428	0.0017	0.9539	-0.41624	0.631085	-0.35842	1.012294
2126	-2	6	0.01	6	0.1	150	45	4	9	1	1	8	1.4665	1	0	1	-0.52614	0.785743	-0.43401	1.125301
2127	2	6	0.01	1	0.01	50	5	14	9	1	1	8	2.4162	0.7515	0.0008	0.9071	-0.5017	0.113845	-0.39844	0.897572
2128	-2	6	0.1	6	0.1	150	45	14	9	1	1	8	1.2543	1	0	1	-0.5316	0.785743	-0.43401	1.125301
2129	-2	14	0.1	1	0.01	50	5	4	1	1	1	8	7.536	0.7892	0.0003	0.9481	-0.36994	0.215778	-0.42067	0.998077
2130	-2	6	0.1	6	0.01	150	45	4	1	1	1	8	1.672	1	0	1	-0.52085	0.785743	-0.43401	1.125301
2131	2	14	0.1	1	0.01	50	45	4	9	1	1	8	68.4554	0.593	0.0002	0.9533	1.197919	-0.31471	-0.42512	1.010824
2132	-2	14	0.1	6	0.01	50	45	14	9	1	1	8	27.6425	0.8774	0.0188	0.3077	0.147537	0.454255	0.401896	-0.57175
2133	-2	14	0.1	6	0.1	50	5	14	1	1	1	8	3.5387	0.6218	0.0017	0.6016	-0.47281	-0.23684	-0.35842	0.148692
2134	2	6	0.01	1	0.01	50	45	14	1	1	1	8	1.9694	0.9631	0.002	0.9257	-0.5132	0.685972	-0.34508	0.943167
2135	2	6	0.1	6	0.1	150	45	4	1	1	1	8	119.0764	0.9335	0.0004	0.9486	2.500729	0.605939	-0.41622	0.999302
2136	-2	14	0.1	6	0.01	150	5	14	9	1	1	8	27.4867	0.7913	0.0078	0.5621	0.143527	0.221456	-0.0872	0.051865
2137	-2	14	0.01	1	0.1	50	45	14	9	1	1	8	5.7358	0.4601	0.0017	0.9068	-0.41627	-0.67405	-0.35842	0.896837
2138	-2	14	0.01	6	0.01	50	5	4	9	1	1	8	2.2929	0.6198	0.0165	0.5814	-0.50487	-0.24225	0.299631	0.099175
2139	2	14	0.1	6	0.1	50	45	4	1	1	1	8	128.4562	0.9572	0.0037	0.721	2.742132	0.670019	-0.2695	0.44138
2140	-2	6	0.01	6	0.1	50	45	14	1	1	1	8	3.6954	0	0.0002	0	-0.46878	-1.91807	-0.42512	-1.32603
2141	-2	6	0.1	1	0.1	50	45	4	1	1	1	8	2.2515	1	0	1	-0.50594	0.785743	-0.43401	1.125301
2142	2	14	0.1	6	0.01	50	5	14	1	1	1	8	6.6474	0.3362	0.0028	0.3278	-0.3928	-1.00905	-0.30951	-0.52248
2143	-2	6	0.01	1	0.01	50	5	4	1	1	1	8	106.0601	0.841	0.0001	0.9781	2.165734	0.355836	-0.42956	1.071617
2144	-2	6	0.1	6	0.1	50	5	4	9	1	1	8	4.6771	0.8587	0.0006	0.8927	-0.44351	0.403694	-0.40733	0.862273
2145	2	14	0.1	1	0.01	150	45	14	1	1	1	8	14.4794	0	0	0	-0.19124	-1.91807	-0.43401	-1.32603
2146	2	14	0.01	1	0.1	50	5	14	1	1	1	8	4.9482	0.7486	0.0003	0.9357	-0.43654	0.106004	-0.42067	0.96768
2147	-2	10	0.055	3.5	0.055	100	25	9	5	1	1	8	24.9732	1	0	1	0.078838	0.785743	-0.43401	1.125301
2148	2	10	0.055	3.5	0.055	100	25	9	5	1	1	8	12.7294	1	0	1	-0.23627	0.785743	-0.43401	1.125301
2149	0	6	0.055	3.5	0.055	100	25	9	5	1	1	8	15.4144	0.9041	0.003	0.7264	-0.16717	0.526447	-0.30062	0.454618
2150	0	14	0.055	3.5	0.055	100	25	9	5	1	1	8	2.4713	0.698	0.0011	0.7591	-0.50028	-0.03081	-0.3851	0.534776
2151	0	10	0.01	3.5	0.055	100	25	9	5	1	1	8	2.4698	0.7558	0.0014	0.8497	-0.50032	0.125471	-0.37176	0.756866
2152	0	10	0.1	3.5	0.055	100	25	9	5	1	1	8	2.0025	0.9415	0.0012	0.9516	-0.51235	0.62757	-0.38065	1.006656
2153	0	10	0.055	1	0.055	100	25	9	5	1	1	8	119.3873	0.9045	0.0024	0.7266	2.50873	0.527528	-0.3273	0.455108
2154	0	10	0.055	6	0.055	100	25	9	5	1	1	8	9.4094	0	0	0	-0.32172	-1.91807	-0.43401	-1.32603
2155	0	10	0.055	3.5	0.01	100	25	9	5	1	1	8	2.4416	1	0	1	-0.50105	0.785743	-0.43401	1.125301
2156	0	10	0.055	3.5	0.1	100	25	9	5	1	1	8	20.4349	0	0	0	-0.03796	-1.91807	-0.43401	-1.32603
2157	0	10	0.055	3.5	0.055	50	25	9	5	1	1	8	113.9094	0.974	0.031	0.2048	2.367748	0.715444	0.944344	-0.82399
2158	0	10	0.055	3.5	0.055	150	25	9	5	1	1	8	4.0041	0.6066	0.0065	0.3938	-0.46083	-0.27794	-0.145	-0.36069
2159	0	10	0.055	3.5	0.055	100	5	9	5	1	1	8	19.9535	0	0	0	-0.05035	-1.91807	-0.43401	-1.32603
2160	0	10	0.055	3.5	0.055	100	45	9	5	1	1	8	2.0719	0.8194	0.0041	0.6413	-0.51056	0.297434	-0.25171	0.24601
2161	0	10	0.055	3.5	0.055	100	25	4	5	1	1	8	1.8003	1	0	1	-0.51755	0.785743	-0.43401	1.125301
2162	0	10	0.055	3.5	0.055	100	25	14	5	1	1	8	2.234	0.9452	0.0017	0.9337	-0.50639	0.637574	-0.35842	0.962778
2163	0	10	0.055	3.5	0.055	100	25	9	1	1	1	8	6.2667	0	0	0	-0.4026	-1.91807	-0.43401	-1.32603
2164	0	10	0.055	3.5	0.055	100	25	9	9	1	1	8	1.2707	1	0.0535	0	-0.53118	0.785743	1.944761	-1.32603
2165	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	113.0509	0.9107	0.0026	0.7133	2.345653	0.544292	-0.3184	0.422505
2166	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	3.034	1	0	1	-0.4858	0.785743	-0.43401	1.125301
2167	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	2.3008	1	0	1	-0.50467	0.785743	-0.43401	1.125301
2168	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	2.6724	0.9812	0.0002	0.9942	-0.49511	0.734911	-0.42512	1.111083

2169	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	4.407	0.9387	0.0026	0.9455	-0.45046	0.619999	-0.3184	0.991703
2170	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	3.021	0.6034	0.0113	0.3699	-0.48614	-0.28659	0.068423	-0.41928
2171	2	6	0.01	6	0.1	50	5	4	1	0	1	8	1.9327	0.9927	0.0213	0.5951	-0.51414	0.766005	0.513053	0.132758
2172	2	6	0.1	1	0.1	50	45	14	9	0	1	8	162.1921	0	0	0	3.610377	-1.91807	-0.43401	-1.32603
2173	2	14	0.01	6	0.1	50	5	14	9	0	1	8	2.7292	0.4518	0	0.9979	-0.49365	-0.69649	-0.43401	1.120153
2174	2	14	0.1	1	0.1	150	45	4	9	0	1	8	2.0923	0.8194	0.0041	0.6413	-0.51004	0.297434	-0.25171	0.24601
2175	2	14	0.01	1	0.1	50	5	4	9	0	1	8	123.8185	0	0	0	2.622774	-1.91807	-0.43401	-1.32603
2176	-2	6	0.01	1	0.1	150	5	14	9	0	1	8	14.76	0	0	0	-0.18401	-1.91807	-0.43401	-1.32603
2177	2	6	0.1	6	0.1	150	5	14	9	0	1	8	2.4357	0.782	0.0049	0.5652	-0.5012	0.196311	-0.21614	0.059464
2178	2	14	0.1	6	0.1	150	5	4	1	0	1	8	98.9581	0.8838	0.0053	0.5382	1.982953	0.471559	-0.19835	-0.00672
2179	2	6	0.01	6	0.01	50	45	4	9	0	1	8	106.0642	0.9162	0.0245	0.3483	2.16584	0.559163	0.655335	-0.47223
2180	2	6	0.01	6	0.01	150	5	14	1	0	1	8	124.902	0.9526	0.0006	0.9306	2.650659	0.657582	-0.40733	0.955179
2181	-2	14	0.01	1	0.1	150	5	4	1	0	1	8	2.5567	1	0	1	-0.49808	0.785743	-0.43401	1.125301
2182	-2	6	0.1	1	0.01	50	5	14	1	0	1	8	4.522	0.6048	0.0047	0.4721	-0.4475	-0.28281	-0.22503	-0.16875
2183	-2	14	0.1	1	0.1	50	5	14	9	0	1	8	3.6442	0.6836	0.0002	0.9882	-0.4701	-0.06974	-0.42512	1.096375
2184	2	14	0.1	6	0.01	150	45	4	9	0	1	8	6.2635	0.9331	0.0114	0.2877	-0.40268	0.604858	0.07287	-0.62078
2185	-2	6	0.01	6	0.01	150	45	14	9	0	1	8	1.1824	1	0	1	-0.53345	0.785743	-0.43401	1.125301
2186	2	14	0.01	1	0.01	150	45	4	1	0	1	8	4.0545	0.0681	0.028	0.0098	-0.45954	-1.73394	0.810955	-1.302
2187	-2	14	0.01	6	0.01	150	45	14	1	0	1	8	6.1697	0	0	0	-0.4051	-1.91807	-0.43401	-1.32603
2188	2	14	0.01	6	0.1	150	45	14	1	0	1	8	1.7529	1	0	1	-0.51877	0.785743	-0.43401	1.125301
2189	2	6	0.1	1	0.01	50	5	4	1	0	1	8	4.9802	0.0705	0.0008	0.7474	-0.43571	-1.72745	-0.39844	0.506095
2190	-2	6	0.1	1	0.01	150	45	4	9	0	1	8	2.6998	1	0	1	-0.4944	0.785743	-0.43401	1.125301
2191	-2	6	0.1	1	0.1	150	5	4	1	0	1	8	2.3479	0.9452	0.0015	0.9436	-0.50346	0.637574	-0.36731	0.987046
2192	2	6	0.01	6	0.01	150	5	4	9	0	1	8	3.0532	1	0.0044	0	-0.48531	0.785743	-0.23837	-1.32603
2193	2	14	0.01	1	0.01	150	5	14	9	0	1	8	8.932	0.1901	0.001	0.4381	-0.33401	-1.40408	-0.38955	-0.2521
2194	-2	6	0.01	1	0.1	150	45	14	1	0	1	8	4.3753	0.9841	0.0001	0.9968	-0.45128	0.742752	-0.42956	1.117456
2195	-2	14	0.01	1	0.01	150	45	4	9	0	1	8	35.6394	1	0.0054	0	0.353349	0.785743	-0.19391	-1.32603
2196	-2	6	0.01	6	0.1	150	45	4	9	0	1	8	2.343	0.5628	0.005	0.8045	-0.50358	-0.39637	-0.21169	0.646066
2197	2	6	0.01	1	0.01	50	5	14	9	0	1	8	5.1947	0.76	0.0021	0.6441	-0.43019	0.136827	-0.34064	0.252873
2198	-2	6	0.1	6	0.1	150	45	14	9	0	1	8	2.3534	0.4518	0	0.9979	-0.50332	-0.69649	-0.43401	1.120153
2199	-2	14	0.1	1	0.01	50	5	4	1	0	1	8	3.6653	0.8571	0.0063	0.4157	-0.46955	0.399368	-0.15389	-0.30701
2200	-2	6	0.1	6	0.01	150	45	4	1	0	1	8	3.8089	0.8669	0.0005	0.9812	-0.46586	0.425865	-0.41178	1.079216
2201	2	14	0.1	1	0.01	50	45	4	9	0	1	8	1.661	1	0	1	-0.52114	0.785743	-0.43401	1.125301
2202	-2	14	0.1	6	0.01	50	45	14	9	0	1	8	65.2671	0.9355	0.1217	0.0447	1.115864	0.611347	4.977136	-1.21645
2203	-2	14	0.1	6	0.1	50	5	14	1	0	1	8	13.3555	0	0	0	-0.22016	-1.91807	-0.43401	-1.32603
2204	2	6	0.01	1	0.01	50	45	14	1	0	1	8	10.3972	0	0	0	-0.2963	-1.91807	-0.43401	-1.32603
2205	2	6	0.1	6	0.1	150	45	4	1	0	1	8	1.7737	1	0	1	-0.51824	0.785743	-0.43401	1.125301
2206	-2	14	0.1	6	0.01	150	5	14	9	0	1	8	1.801	0.782	0.0037	0.6341	-0.51753	0.196311	-0.2695	0.22836
2207	-2	14	0.01	1	0.1	50	45	14	9	0	1	8	5.2948	0.9839	0.0231	0.656	-0.42762	0.742211	0.593086	0.282044
2208	-2	14	0.01	6	0.01	50	5	4	9	0	1	8	5.3849	0.7818	0.0123	0.7419	-0.4253	0.19577	0.112886	0.492613
2209	2	14	0.1	6	0.1	50	45	4	1	0	1	8	2.2276	1	0	1	-0.50655	0.785743	-0.43401	1.125301
2210	-2	6	0.01	6	0.1	50	45	14	1	0	1	8	125.6071	0.9663	0.0016	0.8498	2.668806	0.694624	-0.36287	0.757111
2211	-2	6	0.1	1	0.1	50	45	4	1	0	1	8	1.4412	1	0	1	-0.52679	0.785743	-0.43401	1.125301
2212	2	14	0.1	6	0.01	50	5	14	1	0	1	8	2.7627	0.4518	0	0.9979	-0.49278	-0.69649	-0.43401	1.120153
2213	-2	6	0.01	1	0.01	50	5	4	1	0	1	8	3.2985	0	0	0	-0.47899	-1.91807	-0.43401	-1.32603
2214	-2	6	0.1	6	0.1	50	5	4	9	0	1	8	2.8684	1	0	1	-0.49006	0.785743	-0.43401	1.125301
2215	2	14	0.1	1	0.01	150	45	14	1	0	1	8	3.5548	0	0	0	-0.4724	-1.91807	-0.43401	-1.32603
2216	2	14	0.01	1	0.1	50	5	14	1	0	1	8	3.3851	1	0.0048	0	-0.47676	0.785743	-0.22059	-1.32603
2217	-2	10	0.055	3.5	0.055	100	25	9	5	0	1	8	114.7499	0.8845	0.0042	0.5939	2.389379	0.473452	-0.24726	0.129817
2218	2	10	0.055	3.5	0.055	100	25	9	5	0	1	8	10.716	0	0	0	-0.28809	-1.91807	-0.43401	-1.32603
2219	0	6	0.055	3.5	0.055	100	25	9	5	0	1	8	12.1571	0	0	0	-0.251	-1.91807	-0.43401	-1.32603
2220	0	14	0.055	3.5	0.055	100	25	9	5	0	1	8	15.935	0.9612	0.0082	0.4728	-0.15377	0.680835	-0.06941	-0.16704
2221	0	10	0.01	3.5	0.055	100	25	9	5	0	1	8	11.8806	0.9552	0.0088	0.6095	-0.25812	0.664612	-0.04273	0.168057
2222	0	10	0.1	3.5	0.055	100	25	9	5	0	1	8	120.2371	0.9678	0.0387	0.1653	2.530601	0.69868	1.286709	-0.92082
2223	0	10	0.055	1	0.055	100	25	9	5	0	1	8	4.0799	0.8466	0	1	-0.45888	0.370977	-0.43401	1.125301
2224	0	10	0.055	6	0.055	100	25	9	5	0	1	8	3.4199	0.8412	0	1	-0.47587	0.356377	-0.43401	1.125301
2225	0	10	0.055	3.5	0.01	100	25	9	5	0	1	8	2.1114	0.9626	0.1065	0.0944	-0.50955	0.68462	4.301299	-1.09462
2226	0	10	0.055	3.5	0.1	100	25	9	5	0	1	8	5.0596	0.8368	0.002	0.726	-0.43367	0.34448	-0.34508	0.453637
2227	0	10	0.055	3.5	0.055	50	25	9	5	0	1	8	113.6106	0.9083	0.0099	0.3982	2.360058	0.537803	0.006175	-0.34991
2228	0	10	0.055	3.5	0.055	150	25	9	5	0	1	8	1.8859	0.8194	0.0041	0.6413	-0.51535	0.297434	-0.25171	0.24601
2229	0	10	0.055	3.5	0.055	100	5	9	5	0	1	8	7.7902	0	0	0	-0.36339	-1.91807	-0.43401	-1.32603
2230	0	10	0.055	3.5	0.055	100	45	9	5	0	1	8	2.659	0.9903	0.0351	0.4847	-0.49545	0.759516	1.126642	-0.13787
2231	0	10	0.055	3.5	0.055	100	25	4	5	0	1	8	2.4573	0.9564	0.0068	0.8425	-0.50064	0.667856	-0.13166	0.739217
2232	0	10	0.055	3.5	0.055	100	25	14	5	0	1	8	4.2825	0.6218	0.0017	0.6016	-0.45367	-0.23684	-0.35842	0.148692
2233	0	10	0.055	3.5	0.055	100	25	9	1	0	1	8	115.1862	0.8845	0.0051	0.5501	2.400608	0.473452	-0.20725	0.022449
2234	0	10	0.055	3.5	0.055	100	25	9	9	0	1	8	2.5998	0.5203	0.0006	0.8953	-0.49698	-0.51128	-0.40733	0.868647
2235	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	123.1613	0.9669	0.0033	0.7512	2.60586	0.696246	-0.28728	0.51541
2236	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	4.7364	1	0	1	-0.44199	0.785743	-0.43401	1.125301
2237	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	2.4893	0.9632	0.0022	0.9181	-0.49982	0.686242	-0.33619	0.924537
2238	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	1.8333	1	0.0505	0	-0.5167	0.785743	1.811372	-1.32603
2239	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	2.1138	1	0	1	-0.50948	0.785743	-0.43401	1.125301
2240	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	6.9383	0.3362	0.0037	0.2687	-0.38532	-1.00905	-0.2695	-0.66735

Table A.8 Inner Array Design Points and Resultant Responses for the first Outer Array Design Point (Block 8) in the Crossed Array Design

Std Run	Image	Std Mean Time	SNR Time	Mean TPF	SNR TPF	Mean FPF	SNR FPF	Mean TFP	SNR TFP
1	1…8	-0.120822	-14.78317	-0.256308	-12.43445	-0.29784	3.8945552	0.0051361	-45.35712
2	1…8	-0.108727	-19.072	-0.159173	-17.44728	-0.283946	0.2155395	0.1989748	-14.56336
3	1…8	-0.071952	-23.27925	-0.910225	-3.277874	0.0478592	-28.63455	-0.589832	-4.797729
4	1…8	0.5567125	-7.374325	-0.016006	-36.04361	-0.086085	-17.88543	0.0634777	-22.92305
5	1…8	0.271719	-13.11194	-0.75016	-4.67746	-0.411221	20.82756	-0.255164	-13.40217
6	1…8	-0.421674	15.816219	-0.561467	-6.566535	-0.356198	9.4372336	-0.0897	-21.91003
7	1…8	-0.113529	-13.91323	-0.773041	-4.097923	-0.269495	2.2313397	-0.882551	2.3469044
8	1…8	0.1841408	-16.79981	0.0025826	-53.29502	0.2851804	-15.50121	-0.247504	-13.17979
9	1…8	0.7128879	-4.420438	-0.175869	-16.65609	0.0445245	-27.65689	-0.357936	-9.372078
10	1…8	0.3049397	-12.10692	-0.528244	-7.210588	0.0339646	-27.96081	-0.407729	-7.297409
11	1…8	0.4923075	-10.7214	-0.471126	-8.569282	-0.323962	4.7999095	-0.367435	-9.530125
12	1…8	0.1263738	-21.23339	-0.545785	-7.679418	-0.116098	-16.64382	-0.295489	-11.19822
13	1…8	0.2718821	-13.94204	-0.409851	-8.674167	-0.149445	-9.594966	-0.380151	-8.886776
14	1…8	0.1330563	-18.5666	0.442392	-1.245468	0.1251137	-19.31912	0.2649768	-12.33332
15	1…8	1.1461809	-1.520945	0.6453472	14.084735	1.302271	-1.309817	-0.372889	-8.309521
16	1…8	-0.182896	-9.789974	-0.42266	-9.410869	0.3168602	-14.2595	-0.53866	-5.837571
17	1…8	-0.280678	-6.516066	0.2609322	-11.24814	-0.171121	-7.591663	0.5278816	-4.178482
18	1…8	-0.446063	11.908163	0.4026797	-1.870324	-0.132772	-12.38826	0.3685147	-7.709012
19	1…8	-0.480727	17.370817	-0.273612	-12.62524	-0.339524	3.6786708	0.1865343	-16.52109
20	1…8	0.2722527	-12.2445	0.1388887	-16.12231	0.4435797	-10.80659	0.0055957	-45.6148
21	1…8	-0.436249	13.463497	-0.762225	-4.887891	-0.41789	23.085309	-0.424673	-9.340676
22	1…8	-0.076149	-23.0339	0.0762278	-24.17018	0.032853	-28.38695	-0.200898	-15.17479
23	1…8	-0.248706	-7.037777	-0.04301	-28.68745	1.4384388	-5.462038	-0.374973	-9.955777
24	1…8	0.110348	-23.04475	-0.787472	-3.358661	-0.148334	-10.2276	-0.272967	-10.9712
25	1…8	-0.108626	-18.89886	-0.304571	-12.53672	-0.242817	-3.574349	-0.433958	-7.800511
26	1…8	0.4510161	-12.00091	-0.031553	-31.41268	-0.228367	-1.391067	-0.130576	-18.52022
27	1…8	-0.071893	-22.42029	0.2688071	-10.82316	-0.397326	14.086404	0.6416232	-2.977221
28	1…8	-0.25963	-7.343886	0.2926006	-5.97063	0.2596142	-13.1862	0.1478952	-17.86111
29	1…8	-0.080086	-21.14941	-0.318124	-10.77162	-0.238927	-1.965072	0.1311649	-18.37031
30	1…8	0.7859575	-6.522046	-0.021177	-33.95698	0.0662002	-22.54623	-0.071499	-22.06301
31	1…8	-0.427946	6.4435396	0.1488252	-15.99939	-0.396215	12.990468	0.6084077	-3.187641
32	1…8	-0.125836	-13.19014	0.3009487	-9.75713	0.1834713	-16.56686	0.1558008	-17.20791
33	1…8	0.6517135	-7.435433	-0.210309	-13.81212	0.2162628	-15.8724	0.0284543	-30.93577
34	1…8	-0.306042	0.8953235	-0.991948	-1.446395	-0.410109	21.559377	-0.148501	-18.56972
35	1…8	-0.445407	7.2107294	0.0487503	-28.00733	-0.373427	10.406993	0.0804225	-23.57109
36	1…8	-0.079772	-20.75356	0.2657991	-10.81146	-0.310624	10.513394	-0.127726	-18.52968
37	1…8	-0.399571	5.0337205	0.527089	3.0886904	-0.047736	-20.63434	0.579053	-0.956089
38	1…8	-0.242915	-8.251586	0.4324893	4.6022004	-0.342303	12.203527	0.4043653	-6.081706
39	1…8	-0.142366	-17.10707	0.6480172	11.428854	0.536952	-11.9056	0.0782163	-23.18476
40	1…8	0.1465953	-16.4562	-0.467476	-8.320389	-0.133883	-8.862226	-0.511788	-4.670967
41	1…8	-0.34088	4.2490279	-0.471667	-8.248015	-0.40344	18.714272	0.0233985	-33.86156

42	1…8	0.1879189	-15.32582	-0.331305	-12.02286	0.1873618	-16.15059	-0.485405	-6.752733
43	1..8	0.4939729	-10.52917	-0.828976	-3.105361	-0.416223	26.234004	-0.247197	-13.45715
44	1…8	0.158273	-15.32117	-0.179891	-15.78911	-0.131104	-11.93704	-0.021277	-33.25489
45	1…8	0.2593146	-13.5201	0.6473074	14.991922	0.6158738	-8.33564	-0.36244	-8.847448
46	1…8	-0.444352	14.673828	0.025903	-31.63234	-0.066633	-21.15326	-0.275602	-10.86799
47	1…8	0.3172971	-12.9018	0.1563621	-15.18441	-0.111652	-12.43528	0.1335856	-16.87869
48	1…8	-0.059891	-24.70132	-0.669518	-6.057807	0.5569603	-10.58258	-0.83046	-0.766721
49	1…8	-0.441732	8.458295	0.4358691	-2.724926	-0.382876	13.235762	0.6643286	-2.344974
50	1…8	-0.136652	-17.48936	0.2712067	-10.74553	0.3068561	-12.27982	0.0566139	-25.92167
51	1…8	-0.430053	15.246446	-0.074138	-23.80465	0.1145537	-17.15337	-0.302107	-11.38779
52	1…8	-0.223462	-9.492565	0.1816766	-13.70618	0.3051887	-13.47418	0.1731133	-16.3976
53	1…8	0.1287879	-18.82258	-0.044092	-27.13281	0.1945871	-13.50677	-0.141055	-16.77852
54	1…8	-0.128524	-13.48438	-0.401097	-10.0321	-0.298952	3.6080652	-0.531214	-5.042316
55	1…8	-0.181822	-12.69038	-0.201217	-15.33016	0.2457195	-14.44456	-0.085011	-22.11232
56	1…8	0.2510487	-14.53163	0.4313064	-4.329678	0.3718832	-14.05013	0.0965706	-20.0367
57	1…8	-0.397604	5.6637864	-0.294229	-12.17187	-0.36787	11.438199	0.2091478	-14.24887
58	1…8	0.2219371	-15.32824	0.3677329	-8.015522	1.2600311	-3.206317	-0.644098	-1.618825
59	1…8	0.6137785	-7.655637	0.0255313	-33.50105	-0.079416	-21.45184	0.0716896	-24.31939
60	1…8	-0.378421	4.6561111	-0.438443	-8.908701	0.2162628	-14.99236	-0.480686	-5.694999
61	1…8	0.2200223	-15.46693	0.4291771	-0.197429	0.1823597	-14.32028	0.0753666	-22.10533
62	1…8	-0.47886	25.314155	0.1158387	-17.09743	-0.385099	14.688509	0.6644818	-2.293467
63	1…8	-0.106451	-19.98561	0.3958526	-0.860151	-0.098869	-11.53646	0.3797601	-6.194706
64	1…8	0.5022434	-10.26632	0.0655815	-23.58609	-0.15667	-7.969217	-0.148011	-16.16678
65	1…8	-0.242177	-9.160903	0.2508943	-8.399144	-0.05774	-22.15115	-0.216127	-13.316
66	1…8	0.0646618	-27.05751	-0.211492	-14.22503	-0.233369	-3.15381	-0.065615	-23.26302
67	1…8	-0.511027	25.637185	0.5234389	5.9794281	-0.055517	-24.07101	0.5925353	-1.77778
68	1…8	-0.001437	-57.70107	0.0495614	-25.91974	-0.325074	8.8340143	0.1133928	-18.85635
69	1…8	-0.207384	-11.24751	-0.108713	-20.38863	-0.331188	5.8180551	-0.126868	-19.03874
70	1…8	-0.117383	-18.72498	0.5847479	10.502241	-0.310068	9.25109	0.5236224	-4.063443
71	1…8	-0.18029	-10.24553	0.2788112	-10.30615	0.111219	-21.75334	0.0115708	-39.57612
72	1…8	0.3999152	-10.01172	0.0448973	-26.12543	1.1644357	-7.379945	-0.142189	-17.93113
73	1…8	-0.096224	-19.40754	0.4772712	4.7193386	0.025072	-26.23276	-0.221489	-11.16017
74	1…8	-0.12759	-18.03461	0.3990972	-3.777468	0.5452888	-9.642687	0.0613328	-25.1648
75	1…8	0.5453251	-8.722055	-0.416576	-9.63282	-0.351752	12.723577	-0.392714	-8.387353
76	1…8	0.2511783	-12.98869	0.5456102	8.6726355	0.0778717	-19.45948	0.2220785	-10.17865
77	1…8	-0.076418	-21.43364	0.6172951	6.1260324	0.0506382	-26.10438	0.0707091	-24.02
78	1…8	-0.018455	-34.94159	-0.375614	-10.71467	-0.222809	-4.209516	-0.110383	-19.39151
79	1…8	0.306186	-11.78766	-0.026348	-33.03453	-0.007164	-39.99965	-0.299227	-11.96589
80	1…8	0.304794	-13.79076	-0.83871	-3.24469	-0.377874	11.951469	-0.290555	-11.98958
81	1…8	-0.124196	-17.04067	0.2302777	-11.62422	0.1995891	-16.15133	0.1689154	-16.12719
82	1…8	0.2795484	-12.00761	0.1693742	-10.47296	0.2095933	-15.24359	0.1344129	-16.62068
83	1…8	0.2488997	-14.60611	-0.075929	-20.80762	-0.191685	-5.746049	0.0345214	-29.09258
84	1…8	0.1930771	-14.56075	-1.023549	-0.774544	0.1567935	-19.21742	-0.855249	2.3056578
85	1…8	-0.142148	-12.85425	-0.07478	-23.83824	-0.353419	10.916919	-0.080599	-22.85489
86	1…8	0.0491034	-25.86703	-0.159376	-16.90427	-0.330076	9.7250043	-0.505659	-4.952409
87	1…8	-0.116195	-18.73295	-0.235015	-13.13136	-0.360644	10.76672	0.1783223	-15.10035
88	1…8	-0.47625	21.906247	0.1478451	-15.71504	0.0800949	-19.30877	-0.005742	-46.21787
89	1…8	-0.004488	-48.86939	-0.451185	-7.097266	0.4941564	-12.73359	-0.201909	-14.24611

90	1…8	0.1335601	-18.96826	0.4968401	3.1689086	1.1727725	-6.899023	-0.031664	-30.10741
91	1…8	-0.459822	14.25522	0.2025974	-13.76882	-0.358977	10.521144	0.3186302	-10.71967
92	1…8	-0.387521	5.2024062	-0.173368	-16.52846	0.0778717	-20.09718	-0.27309	-12.5238
93	1…8	-0.155228	-13.84736	0.3933516	-1.41305	-0.063298	-18.74567	0.4094825	-5.883945
94	1…8	0.6677892	-8.049106	-0.122029	-19.37641	0.1723556	-16.06225	-0.136734	-18.93164
95	1…8	-0.46916	24.325938	0.4665574	-0.642025	0.1823597	-14.99173	0.2833004	-11.31743
96	1…8	-0.152445	-14.48346	0.3477585	-8.524933	0.1106632	-21.70405	-0.235033	-13.79601
97	1…8	0.0616419	-23.58307	-0.392039	-7.863879	-0.07886	-17.10557	-0.079588	-22.36599
98	1…8	-0.477704	19.27145	0.196311	-13.14672	-0.228923	-6.23921	0.3712724	-8.794228
99	1…8	-0.487968	21.659059	0.199826	-13.67644	-0.081083	-19.16146	-0.001789	-55.27941
100	1…8	0.3061651	-13.89844	0.179277	-14.14885	0.7403701	-8.374132	-0.339919	-9.879831
101	1…8	0.2711946	-13.98985	0.0430723	-24.32374	-0.31896	7.9744494	0.4287254	-3.67085
102	1…8	-0.015735	-36.28221	-0.009754	-39.0558	-0.054406	-23.95772	0.2206077	-12.11028
103	1…8	0.3491683	-11.24504	0.2384905	-11.86315	0.2773994	-11.67241	-0.063409	-23.67233
104	1…8	0.2606632	-13.97423	-0.414312	-9.722121	-0.112207	-16.59496	-0.301954	-11.08391
105	1…8	0.1989541	-16.18779	0.7302808	17.463947	0.474148	-7.848859	-0.132077	-18.80051
106	1…8	0.2498851	-13.66545	-0.024287	-33.75775	0.212928	-15.96606	-0.443334	-7.491729
107	1…8	-0.003471	-49.16479	0.1762014	-14.27529	-0.031063	-23.82119	-0.33091	-7.533784
108	1…8	0.143173	-15.35331	-0.491202	-7.913426	0.6575578	-11.84922	-0.470146	-6.695224
109	1…8	0.0682279	-23.17847	-0.899714	-2.529323	-0.311735	4.98768	-0.479553	-6.277604
110	1…8	-0.31773	1.3919019	0.0027516	-51.49298	-0.280611	0.6013325	0.2713808	-10.53091
111	1…8	0.2543185	-13.55225	0.6192215	8.2621998	0.8531949	-6.477589	-0.288257	-10.67921
112	1…8	0.044973	-27.0761	-0.290883	-11.63905	0.3257528	-14.66248	0.0591572	-25.49508
113	1…8	0.208723	-16.63755	-0.011849	-40.09745	-0.312847	3.6647576	-0.105174	-20.72328
114	1…8	0.4217192	-9.639573	0.4288053	-2.92583	-0.195576	-6.914171	0.3434499	-7.016921
115	1…8	-0.459623	15.39556	0.2757018	-10.75083	-0.265605	-2.040623	0.2323128	-13.09057
116	1…8	-0.343291	1.3787031	0.364049	-3.143886	-0.12777	-10.25157	0.2295551	-10.9839
117	1…8	-0.097853	-20.85108	-0.256443	-14.60568	-0.312847	5.3848475	-0.465764	-8.192562
118	1…8	-0.440491	9.5982673	-0.097121	-21.48586	-0.364535	10.530815	-0.22394	-14.55492
119	1…8	-0.152622	-12.25789	0.2257826	-12.35726	0.1078843	-19.38379	0.14287	-18.30736
120	1…8	0.1090506	-22.59168	-0.124666	-19.33698	-0.301731	3.5023455	-0.065554	-24.8589
121	1…8	-0.156936	-15.31583	0.4549985	0.2745957	-0.05385	-23.71782	0.5955382	-3.642481
122	1…8	-0.409396	9.7491513	-0.653667	-6.367066	-0.019947	-32.60309	-0.514024	-6.187708
123	1…8	0.7407822	-7.236138	-0.309438	-12.7301	-0.015501	-35.51097	-0.320216	-11.60279
124	1…8	0.5396244	-8.490728	-0.097391	-22.01279	0.1156653	-20.35267	0.1183261	-19.95242
125	1…8	-0.314301	0.7074327	-0.130479	-16.19368	-0.111652	-8.589863	0.1465777	-15.49885
126	1…8	0.3653224	-10.86081	0.2265937	-12.2602	0.5169436	-10.77031	-0.007274	-43.13102
127	1…8	0.1580043	-17.91907	0.246264	-11.18812	-0.013833	-34.02916	0.3222765	-8.778353
128	1…8	0.2676201	-14.216	0.2137844	-12.48661	0.2707299	-12.95605	0.0826593	-20.5464
129	1…8	-0.476876	18.7941	0.0827508	-21.30222	-0.357865	8.5810564	0.6408265	-1.632558
130	1…8	-0.03002	-30.70291	0.3146367	-9.314189	0.0873201	-20.95758	-0.561029	-5.812576
131	1…8	0.0287809	-33.72342	-0.463995	-7.659512	-0.298396	-0.661442	0.1076016	-19.43074
132	1…8	0.2714056	-13.68247	0.362866	-8.161974	0.5658529	-8.753719	-0.383675	-8.947452
133	1…8	0.5293443	-7.839588	-0.333907	-11.9724	-0.185571	-10.24106	-0.177672	-15.44178
134	1…8	-0.400637	4.6158162	0.2903362	-10.01795	0.0978801	-21.80194	-0.00614	-44.88655
135	1…8	-0.112279	-18.02416	0.3233227	-9.055556	0.2579468	-9.982369	-0.028754	-30.75201
136	1…8	-0.166938	-14.52686	0.0758898	-22.1338	0.3946705	-9.62132	0.1005233	-20.93396
137	1…8	-0.244983	-8.995017	0.2253432	-12.15006	0.2257111	-11.689	-0.070089	-22.09048

138	1…8	-0.119026	-18.16761	-0.116757	-18.52719	-0.327297	6.7308161	0.402343	-6.497143
139	1…8	-0.469886	16.847507	0.049629	-25.87793	0.5736339	-12.77861	0.2180645	-13.72306
140	1…8	-0.310316	-0.467954	-0.546191	-7.021447	-0.377874	13.182105	-0.310564	-11.22741
141	1…8	-0.105956	-19.74117	0.4006519	-1.580323	1.0188195	-7.253284	0.1267525	-18.40092
142	1…8	-0.452484	16.345768	-0.102528	-20.85771	-0.001606	-54.19186	-0.142464	-17.27251
143	1…8	-0.366405	4.1551423	-0.402956	-9.954101	-0.185571	-3.841827	-0.451699	-7.548516
144	1…8	-0.149135	-15.57058	0.3788185	-7.855063	0.3585443	-11.35197	-0.322239	-10.59286
145	1…8	0.4166807	-8.995487	0.6102314	7.4673185	0.1445662	-16.57563	0.3829775	-8.064497
146	1…8	-0.300325	-5.533317	0.314096	-9.391279	-0.343971	7.7423218	0.3407534	-10.00346
147	1…8	-0.352508	3.5996689	-0.164953	-15.80505	-0.156115	-10.83568	0.0894924	-19.39495
148	1…8	0.5410332	-8.401236	-0.280405	-13.73706	-0.362312	7.8117708	-0.151688	-18.40628
149	1…8	-0.132912	-17.55602	0.5852887	5.7855267	-0.198354	-4.911768	0.3451352	-8.23692
150	1…8	-0.14599	-16.20739	0.6292595	4.8738217	-0.352308	9.3657921	0.2918188	-11.28801
151	1…8	0.0448649	-26.92078	0.1059022	-18.33929	-0.220586	-1.679952	0.0229082	-30.84592
152	1…8	-0.070489	-23.42528	0.0428695	-28.33293	0.2618373	-16.45144	0.0430704	-27.39141
153	1…8	-0.327545	1.1805069	0.1333459	-13.67306	-0.273942	2.0305475	0.4488263	-3.085098
154	1…8	0.1925238	-16.56559	-0.09685	-21.51594	0.2551679	-14.38607	-0.512523	-6.288526
155	1…8	-0.100473	-18.94336	-0.529663	-7.903988	0.2996308	-16.45714	-0.247228	-13.51235
156	1…8	0.307384	-13.26541	-0.258099	-14.53338	-0.392324	14.860017	-0.196179	-15.89599
157	1…8	-0.268272	-6.998704	0.2430532	-8.386472	-0.344527	8.0631986	0.4087164	-7.535241
158	1…8	-0.494133	23.549183	0.2351446	-12.63879	0.3546538	-12.55578	0.2906544	-11.99058
159	1…8	0.0082772	-41.11451	0.2020904	-13.07139	-0.312291	4.2790348	0.5751616	-3.229405
160	1…8	0.3712187	-10.32696	-0.005461	-46.72236	0.4652554	-10.49839	-0.192288	-15.39864
161	1…8	-0.095052	-21.4208	0.7454897	21.566781	-0.355086	11.712749	0.4194104	-8.352309
162	1…8	0.1825834	-15.46167	0.1721119	-13.91182	0.5380636	-9.158767	-0.004271	-45.76394
163	1…8	0.5236076	-8.693904	0.1082004	-18.82346	0.3941147	-11.46772	0.0939048	-21.39723
164	1…8	0.4020948	-10.65307	0.2659681	-10.56886	-0.271163	5.7483523	0.0332651	-28.91259
165	1…8	0.2966529	-13.46531	-0.460412	-8.082185	-0.117765	-13.30305	-0.260802	-12.47148
166	1…8	-0.117804	-18.69778	0.607122	9.1108019	0.2045912	-14.94732	0.2463773	-11.78497
167	1…8	-0.480287	23.225853	0.3319749	-9.014744	-0.380097	13.511692	0.4505116	-7.750616
168	1…8	-0.447569	15.026881	0.0739296	-21.36017	-0.279499	0.8025775	0.4029865	-6.747512
169	1…8	-0.390224	5.1847399	0.0983315	-19.48109	-0.306177	2.0395537	0.3436031	-8.510775
170	1…8	-0.471424	19.601552	0.3613113	-4.489432	-0.380097	15.502634	0.5751003	-3.530646
171	1…8	-0.179363	-10.38454	-0.155895	-17.26914	0.0428571	-26.00544	-0.027742	-31.13955
172	1…8	-0.386585	4.6625205	-0.135075	-17.49566	-0.002717	-43.71988	-0.27119	-9.986471
173	1…8	0.1904729	-15.48347	0.1712331	-14.44005	-0.332299	10.266807	0.0521096	-25.24771
174	1…8	-0.269096	-6.655176	-0.30937	-12.69927	0.7109134	-9.768021	-0.53195	-5.736654
175	1…8	0.3277104	-11.97947	-0.05413	-26.64127	-0.327297	4.0889976	0.219474	-13.70102
176	1…8	0.4956349	-8.821804	-0.540884	-6.663155	-0.003829	-46.9264	-0.437083	-7.618361
177	1…8	-0.081161	-21.58252	-0.41857	-8.53357	0.1023264	-22.68522	-0.089363	-21.72659
178	1…8	-0.071985	-23.34861	0.2207467	-12.49482	0.414123	-13.17391	0.0867653	-21.14156
179	1…8	-0.061807	-25.27562	-0.291356	-13.22435	-0.260603	0.8002869	0.033786	-30.56259
180	1…8	0.2681873	-13.3692	0.081534	-21.40979	-0.302287	1.7344182	0.4256919	-6.76941
181	1…8	-0.118905	-18.54703	0.4337736	-5.535679	0.3163045	-12.93718	0.3526117	-9.399474
182	1…8	0.0086848	-43.56813	-0.177728	-14.91349	0.1028822	-18.93258	-0.005282	-45.55208
183	1…8	0.1987459	-16.17006	0.4462449	-1.309605	0.5241689	-9.477932	0.2678571	-11.81914
184	1…8	-0.34726	3.7609807	-0.008097	-41.40515	-0.272274	0.4075466	0.2088414	-13.18001
185	1…8	0.657158	-6.811385	0.1635948	-14.73996	0.3896684	-10.18663	-0.212174	-11.37869

186	1…8	-0.41784	12.584432	-0.084717	-22.76414	-0.341748	7.9950878	-0.025904	-32.9212
187	1…8	0.491685	-9.01073	-0.075862	-23.61612	-0.419002	23.993005	0.4153963	-8.437959
188	1…8	-0.029916	-30.80169	0.1656565	-14.79226	-0.041623	-26.01829	0.1874229	-14.30443
189	1…8	-0.247116	-1.433078	-0.354287	-11.29861	-0.181681	-6.284753	-0.260159	-12.29718
190	1…8	0.2173145	-16.70211	-0.625683	-5.271304	-0.214472	-2.18165	-0.209324	-13.79763
191	1…8	-0.281974	1.7979745	-0.49715	-7.570009	-0.235036	-2.922977	-0.205433	-13.57512
192	1…8	0.2382454	-15.09252	0.1982375	-13.1972	-0.255045	-2.964547	0.0735587	-23.38702
193	1…8	0.9825084	-2.22371	-0.111349	-18.37019	0.90266	-9.752956	-0.052041	-25.82223
194	1…8	-0.087008	-16.5436	-0.447636	-7.273203	-0.341748	6.8896192	0.1610098	-16.2362
195	1…8	-0.420098	6.4760116	0.4166382	-7.134035	-0.236704	-5.188748	0.3661553	-9.644568
196	1…8	0.3165662	-12.30861	-0.646198	-6.537118	-0.237815	-6.07616	-0.664475	-4.253988
197	1…8	0.2078644	-15.3814	-0.112194	-20.25885	-0.011054	-33.92849	-0.227219	-12.19834
198	1…8	-0.44595	17.24093	-0.065249	-22.74414	-0.326186	10.004385	0.0513742	-25.77105
199	1…8	-0.025192	-32.2649	-0.724473	-4.947682	0.0789833	-24.04929	-0.590199	-4.410275
200	1…8	-0.039006	-28.52612	-0.190199	-15.29923	-0.042734	-25.09742	-0.33713	-8.466682
201	1…8	-0.454688	9.1573165	0.0930928	-20.01384	-0.396771	16.082326	0.5781338	-3.259211
202	1…8	-0.23991	-7.139681	0.301895	-9.704562	-0.265049	-2.188699	0.2194127	-13.53058
203	1…8	0.2546791	-13.11167	-0.158058	-16.8894	0.2151512	-14.06447	-0.09638	-20.12819
204	1…8	0.1764163	-17.4117	0.6369653	12.244286	0.8315192	-7.948968	0.1949607	-14.19715
205	1…8	0.365832	-10.95843	-0.31809	-12.40548	0.2151512	-16.0048	-0.551959	-3.508996
206	1…8	-0.480491	27.756453	0.2419379	-7.580802	-0.200578	-8.88681	0.6228092	-2.002365
207	1…8	0.4710246	-9.069068	-0.119596	-19.48692	0.5519582	-5.742193	-0.545064	-4.20742
208	1…8	-0.467743	21.522689	0.2921275	-9.771569	-0.278944	1.6397381	0.3256165	-10.51027
209	1…8	-0.294762	1.545884	-0.039191	-29.57201	-0.366758	13.642302	-0.019193	-35.41177
210	1…8	0.6604189	-8.349769	-0.463454	-8.581651	-0.257824	1.0237684	-0.329225	-9.578903
211	1…8	0.2801715	-12.58862	-0.713557	-4.665072	-0.073858	-18.05248	-0.613089	-1.662936
212	1…8	0.6048678	-8.374107	0.0051175	-45.84811	-0.166675	-11.9797	0.3305804	-9.838774
213	1…8	-0.274038	-6.212828	0.2057406	-10.51351	-0.358977	10.827921	0.5013153	-5.119915
214	1…8	-0.443493	12.647709	0.3105134	-9.567918	0.8304076	-5.824706	-0.076677	-22.19009
215	1…8	-0.089561	-21.75807	0.1425051	-16.04009	-0.151113	-8.244331	0.1374771	-16.98444
216	1…8	0.1204625	-19.28185	-0.297304	-13.12447	0.5547372	-10.4717	-0.715462	-3.721854
217	1…8	0.5234422	-8.649727	-0.472681	-8.16795	-0.313402	9.0573405	-0.317857	-8.464123
218	1…8	0.4229732	-9.228995	-0.235995	-13.17102	-0.323962	9.8355917	-0.040397	-26.70003
219	1…8	0.16055	-17.41708	0.5514234	4.2344518	0.6742314	-4.697108	-0.05774	-22.4046
220	1…8	0.9612243	-4.327798	0.6517687	9.2938078	0.0489708	-25.46332	0.1344742	-17.07627
221	1…8	-0.076679	-23.14948	0.3148733	-3.677258	0.8759822	-7.17011	-0.074471	-22.21377
222	1…8	0.265308	-13.80881	-0.147141	-17.69998	-0.210026	0.4764717	-0.355577	-8.093321
223	1…8	-0.353901	3.7626502	-0.316332	-10.43615	-0.31896	8.9962608	-0.103151	-20.30224
224	1…8	-0.328328	1.3169936	0.5220194	6.428969	0.753709	-5.367878	-0.211377	-11.20701
225	1…8	-0.059892	-25.35345	0.4197138	-7.058675	-0.356754	11.525223	0.1201952	-20.04929
226	1…8	0.3949976	-10.04596	-0.044464	-28.12215	0.2468311	-14.98471	0.0153397	-37.22498
227	1…8	-0.084237	-22.17872	-0.004988	-47.59825	-0.230034	-2.495083	-0.344791	-10.13445
228	1…8	0.1667715	-17.2816	0.2075656	-12.57312	-0.017724	-35.11607	0.3413356	-9.13444
229	1…8	-0.08108	-21.96042	-0.088536	-21.97488	-0.411777	23.502899	0.6665654	-1.943839
230	1…8	-0.456657	15.016311	-0.192903	-15.63859	-0.3612	7.8196557	0.0723024	-24.33862
231	1…8	0.2811254	-14.03595	0.2740119	-10.30822	-0.208359	-4.668309	0.2653751	-11.54731
232	1…8	0.1797762	-16.93404	0.1321968	-17.4767	-0.381208	14.716575	0.3069864	-10.88297
233	1…8	-0.094518	-20.58719	-0.018778	-34.87196	-0.170009	-5.650705	0.0836092	-19.74235

234	1…8	-0.408784	5.3567494	0.1800881	-14.57544	0.0695349	-18.53036	0.1868407	-13.36061
235	1…8	-0.03695	-28.00802	0.145851	-11.97647	0.1540146	-17.38472	0.0644276	-23.16882
236	1…8	-0.451833	15.576436	-0.096039	-21.84959	-0.330076	7.5204348	0.3655118	-9.245209
237	1…8	-0.160954	-14.82128	0.3434324	-8.744793	-0.040511	-26.59547	-0.22489	-14.07487
238	1…8	0.185886	-14.59615	-0.603917	-5.642229	-0.284502	1.2009302	-0.248423	-12.29896
239	1…8	-0.401852	11.850021	-0.608818	-5.725069	-0.373427	11.982641	-0.103948	-20.55845
240	1…8	-0.202683	-8.926598	0.5730539	6.6426394	-0.082195	-19.43115	0.3220008	-10.40622
241	1…8	-0.215829	-7.95827	-0.533888	-7.24363	-0.397326	16.779125	0.0348891	-30.62968
242	1…8	0.1660116	-16.4257	0.2536657	-11.0135	0.4441355	-12.49098	0.0412012	-28.6546
243	1…8	0.2547132	-14.26783	-0.016175	-37.29381	-0.384543	12.713875	0.2576534	-12.37778
244	1…8	0.3286617	-8.765557	-0.513441	-7.304437	0.2062586	-14.0206	-0.516905	-5.098429
245	1…8	-0.422726	8.7953959	0.1135067	-18.52338	0.119	-17.45341	0.210496	-12.22806
246	1…8	-0.14577	-15.46021	0.1929312	-13.14986	-0.186127	-6.196791	-0.073153	-22.2918
247	1…8	-0.328019	1.6390832	0.2787774	-10.51106	1.0910718	-5.567295	-0.135141	-17.91046
248	1…8	-0.375373	5.3376656	-0.052744	-26.88552	-0.192797	-2.762624	0.1386721	-17.36956
249	1…8	0.0342274	-29.01705	-0.080458	-23.1444	-0.32952	9.1295226	0.1475888	-16.86186
250	1…8	0.1171701	-20.16476	0.5758253	4.3295089	0.2890709	-12.8693	0.5237756	-2.013765
251	1…8	-0.149744	-16.12836	0.2719164	-7.531356	-0.347305	6.1482923	0.972154	13.243688
252	1…8	0.1785887	-16.85253	0.2596479	-6.88688	0.3285318	-9.965164	0.0739264	-20.70653
253	1…8	-0.485942	23.758453	0.2465006	-11.92858	-0.048292	-25.02377	-0.001391	-58.52947
254	1…8	-0.456751	17.468872	-0.157449	-16.6477	-0.420114	23.598707	0.7917057	-0.686278
255	1…8	0.3156773	-12.81497	-0.62673	-6.881857	-0.423448	23.557377	-0.121659	-20.49638
256	1…8	0.0226826	-33.20638	0.6107721	7.895342	0.0967685	-19.03368	0.1183874	-19.40647
257	1…8	0.6149775	-7.754997	-0.106043	-20.67878	0.5308383	-9.468437	-0.255808	-12.43129
258	1…8	-0.398879	8.4342496	-0.452537	-9.537265	-0.038288	-27.51424	-0.584439	-5.599131
259	1…8	-0.380086	4.425926	-0.314879	-10.98438	-0.277832	0.7033851	0.2154293	-13.94162
260	1…8	-0.356996	3.2861585	0.3094319	-9.605389	0.2907382	-9.833716	-0.083663	-21.7304
261	1…8	-0.248481	-6.595534	0.094073	-16.94611	-0.192797	-2.93958	0.2887853	-6.46375
262	1…8	0.6467293	-7.418567	-0.77811	-2.816677	-0.120544	-14.11097	-0.226177	-13.86049
263	1…8	0.3160392	-12.2557	0.4963331	8.5876527	-0.346194	14.253877	0.6698134	3.6317793
264	1…8	-0.488284	25.939813	0.3093305	-1.408637	-0.300619	4.7388799	0.7356316	4.2945773
265	1…8	-0.171614	-10.90534	0.0464858	-26.17149	0.5625182	-9.629834	0.0164122	-36.79639
266	1…8	-0.031588	-29.82148	-0.152109	-16.7728	0.0128446	-35.33385	-0.039938	-28.33564
267	1…8	0.5768539	-7.0326	0.4681796	-0.118558	-0.27672	1.6037059	0.6313889	0.3797224
268	1…8	-0.180294	-11.59175	-0.135109	-18.35029	-0.063854	-22.2372	-0.186772	-14.64143
269	1…8	-0.381091	5.2490264	-0.555181	-6.564308	0.7742731	-5.746908	-0.784743	-0.462079
270	1…8	1.1439357	-2.582865	0.2134126	-12.65913	0.2629489	-10.75072	0.0135625	-37.12626
271	1…8	-0.113285	-19.06922	-0.001879	-56.06509	-0.145555	-10.57487	-0.260128	-11.41382
272	1…8	0.2449462	-14.57082	0.1060712	-16.25773	-0.315626	9.6539626	0.4469572	-3.209502
273	1…8	0.7314337	-6.981026	-0.204631	-14.99074	0.0895433	-23.29066	-0.26975	-12.52962
274	1…8	-0.461456	22.103434	-0.190199	-13.46684	-0.228923	-2.151492	0.2170227	-12.5168
275	1…8	0.6808295	-6.266688	-0.328432	-12.13898	-0.358977	9.2117743	-0.076248	-23.11804
276	1…8	-0.006258	-44.51239	0.1300675	-17.45664	-0.341192	8.9437052	0.5511386	-3.32806
277	1…8	0.3466895	-10.16128	0.5640637	12.19732	0.6342147	-11.70637	0.3848773	-6.333376
278	1…8	0.3920769	-11.36958	-0.129972	-17.18774	-0.068856	-21.00055	0.1339227	-17.83636
279	1…8	-0.48837	30.297874	0.6148278	8.6756182	0.134562	-17.86376	0.1155377	-19.93024
280	1…8	-0.23132	-7.74555	-0.188712	-13.86903	-0.295061	2.4520601	0.0713219	-22.54093

Table A.9 Mean Responses and SNR's Across the Noise Space

Appendix B. Additional Figures and Analysis from the Combined Array Design

The following Appendix contains additional figures, analysis, and results.

Std Run	Dim Adj	Max Score	Bin width SNR	PT SNR thresh	Bin Width Ident	Smooth iter hi	Smooth iter lo	Low SNR	Window Size	Threshold Both Sides	Clean Signal	Image (Noise)	Time	TPF	FPF	TFP
1	-2	6	0.01	1	0.01	50	45	14	9	1	0	3	2.2723	0.9801	0.0393	0.5054
2	2	14	0.1	6	0.01	50	5	4	1	1	1	3	3.6441	0	0	0
3	2	6	0.1	1	0.01	50	5	14	1	0	1	1	2.174	1	0	1
4	-2	14	0.06	6	0.1	50	5	14	1	0	1	2	4.7273	0	0	0
5	-2	14	0.01	1	0.1	50	5	7.3333333	1	0	1	1	1.1967	1	0	1
6	2	6	0.1	6	0.01	83	45	4	1	0	0	4	2.4833	1	0.0103	0
7	2	14	0.01	3.2222222	0.08	50	5	4	1	1	0	3	3.1197	0.52	0.0003	0.982
8	-2	14	0.07	6	0.06	150	45	4	1	1	0	3	2.6914	0.4579	0.0006	0.9657
9	-2	14	0.1	6	0.01	50	45	4	6	0	0	7	3.1509	0.8061	0.0085	0.3393
10	-2	14	0.01	6	0.1	139	45	4	1	0	0	2	7.4978	0	0.0004	0
11	-2	6	0.1	1	0.01	50	45	4	1	0	0	5	2.1368	0.9838	0.0267	0.5369
12	-2	14	0.01	6	0.01	50	45	14	1	0	0	5	1.8728	0.9818	0.0177	0.6275
13	2	14	0.1	6	0.01	150	5	14	1	0	1	2	20.3574	0	0	0
14	-2	6	0.1	1	0.01	50	32	4	9	1	1	7	4.3013	0.6986	0.0039	0.5509
15	2	6	0.01	1	0.1	50	5	14	9	1	0	4	2.7026	1	0.006	0
16	2	14	0.01	1	0.1	50	45	14	9	1	1	5	4.9425	0.6561	0.0003	0.985
17	2	6	0.1	6	0.1	50	5	14	1	1	0	6	114.2106	0.8906	0.0063	0.4949
18	-2	6	0.01	2.628176	0.1	50	45	14	1	1	1	7	15.5156	0	0	0
19	-2	14	0.1	6	0.1	150	5	14	1	1	1	8	6.9816	0	0	0
20	-2	11.333333	0.1	1	0.1	50	5	4	1	0	1	8	2.227	0	0	0
21	-2	14	0.1	1	0.1	150	5	14	1	0	1	6	128.5538	0	0	0
22	2	14	0.1	1	0.1	50	5	14	9	1	1	2	4.9518	0	0.0016	0
23	2	8.6409842	0.1	4.8888889	0.1	150	5	14	1	1	0	1	2.0776	1	0	1
24	2	6	0.1	6	0.1	150	45	14	9	0	1	4	3.3736	1	0.0012	0
25	-2	6	0.01	1	0.0799151	50	14	14	5	0	1	5	3.6425	0.8598	0	1
26	2	14	0.01	1	0.01	50	5	14	1	0	0	6	114.0148	0.9695	0.0357	0.1854
27	-2	14	0.01	1	0.0284708	150	32	4	1	1	0	7	2.3232	0.7826	0.0056	0.4257
28	-2	6	0.1	1	0.1	150	45	14	1	1	0	4	2.2943	1	0	1
29	2	10.434934	0.06	1	0.1	150	5	14	9	0	0	3	3.4368	0.4479	0.0009	0.945
30	-2	6	0.1	6	0.01	50	45	14	1	1	1	2	3.3168	0	0	0
31	-2	14	0.07	6	0.01	150	45	4	9	1	1	2	7.257	0	0	0
32	2	14	0.1	1	0.1	83	45	14	7	0	0	1	25.6183	1	0	1
33	-2	14	0.01	1	0.01	50	5	14	1	1	1	4	1.7164	1	0	1
34	-2	12.222222	0.1	2.1111111	0.01	139	5	14	9	1	1	5	3.8639	0.9377	0.0099	0.7861
35	1	14	0.1	6	0.1	150	5	6.2222222	8	1	0	6	140.5366	0.8963	0.0042	0.5963
36	-2	6	0.1	6	0.01	150	5	10.666667	1	0	1	7	3.4011	0	0	0
37	-2	6	0.01	1	0.1	150	5	8.4444444	1	1	0	8	1.8088	0.8288	0.0052	0.5874
38	-2	13.111111	0.01	1	0.01	150	5	14	1	0	0	3	2.5269	0.9561	0.0056	0.8669
39	-2	14	0.1	1	0.1	150	45	7.3333333	9	0	1	5	3.349	0.5932	0	1
40	2	6	0.01	1	0.01	50	5	4	9	0	0	8	2.1665	0.9568	0.112	0.0888
41	-2	14	0.01	4.8888889	0.1	150	45	14	5	1	1	1	1.2539	1	0	1
42	-2	14	0.1	6	0.1	50	45	4	1	1	1	4	1.7261	1	0	1
43	2	14	0.03	1	0.01	150	5	4	4	0	1	5	3.0282	0.979	0.0113	0.7949
44	1	6	0.01	6	0.1	50	5	4	9	0	1	6	141.2633	0.927	0.0026	0.7345
45	0	14	0.01	6	0.01	50	5	14	5	1	1	7	5.2683	0.895	0.0112	0.3845
46	-1	6	0.02	6	0.01	150	45	4	1	0	1	8	10.1164	0	0	0
47	2	6	0.01	6	0.01	50	5	14	5	0	0	2	4.4018	0.8275	0.0317	0.1034
48	2	6.8888889	0.1	1	0.1	94	45	11.777778	1	0	1	5	29.4813	0	0	0
49	2	14	0.1	1	0.06	50	5	4	1	1	0	5	2.2418	0.9572	0.0016	0.9405
50	-2	6	0.1	6	0.1	50	45	4	1	0	1	1	1.2963	1	0	1
51	2	14	0.0302406	6	0.01	50	5	4	9	1	1	4	2.6556	1	0	1
52	-2	14	0.01	6	0.01	106	23	4	9	1	0	5	2.1696	0.9928	0.0242	0.5661
53	2	6	0.01	1	0.01	150	45	14	1	0	1	2	48.7212	0	0	0
54	2	14	0.1	1	0.01	50	45	14	1	0	1	7	17.643	0	0	0
55	-2	6	0.01	6	0.01	50	5	14	9	1	1	8	2.1245	0.8049	0.0552	0.1558
56	2	6	0.1	1	0.01	50	45	14	1	0	0	3	3.9133	0.9679	0.023	0.6284
57	2	14	0.1	6	0.1	50	45	14	5	1	0	3	3.7498	0.4208	0	0.9977
58	-2	14	0.1	6	0.1	50	5	4	9	1	0	2	3.0377	0	0	0
59	2	14	0.01	6	0.01	50	45	4	1	0	1	1	2.0915	1	0	1
60	-2	6	0.1	6	0.01	50	5	14	1	1	0	4	2.5646	1	0	1
61	2	14	0.1	6	0.01	50	45	7.3521778	9	0	1	8	3.0129	0.6505	0.0177	0.2966
62	-2	14	0.01	6	0.01	150	14	12.888889	9	0	1	6	102.466	0.9288	0.0057	0.6784
63	-2	14	0.1	6	0.1	50	45	14	9	1	0	7	2.6648	0.6959	0.0013	0.7203
64	-2	14	0.1	1	0.01	150	5	4	9	1	0	8	1.5736	0.9489	0.0775	0.1172
65	2	14	0.01	6	0.1	50	45	14	1	0	1	8	10.3465	0	0	0
66	2	7.7777778	0.01	6	0.01	94	45	14	1	1	1	3	13.8299	0	0	0
67	-2	14	0.01	5.4444444	0.01	150	5	14	1	1	0	2	5.7714	0.017	0.0153	0.0045
68	2	14	0.01	6	0.1	50	5	14	9	1	0	1	1.862	1	0	1
69	-2	14	0.03	1	0.1	150	5	4	9	1	0	4	24.5681	1	0	1
70	2	8.6666667	0.01	6	0.06	150	45	4	9	0	1	5	6.3434	0.6726	0.0008	0.961
71	-2	6	0.1	1	0.01	150	45	14	9	1	0	6	88.194	0.9659	0.0527	0.1293
72	-2	10.468985	0.06	6	0.1	150	5	4	9	0	1	7	2.513	0.7661	0.0008	0.8397
73	-2	6	0.1	1	0.1	50	45	14	9	1	1	8	3.0995	0.5203	0.0002	0.9506
74	-2	6	0.1	6	0.06	50	5	14	9	0	0	3	2.4379	0.4512	0.0016	0.9077
75	-1	6	0.1	6	0.01	150	5	14	9	1	1	3	6.0795	0.4958	0.0034	0.8528
76	2	6	0.01	6	0.1	150	45	14	9	1	0	2	4.6393	0.5149	0.0016	0.5628
77	0	14	0.1	3.2222222	0.1	94	5	4	9	1	1	1	1.5077	1	0	1
78	-2	6	0.01	6	0.01	150	45	4	9	1	1	4	2.1729	1	0.0284	0

79	2	6	0.1	6	0.01	150	45	14	1	1	0	5	2.2803	1	0.0413	0.4575
80	-2	6	0.1	6	0.1	150	32	4	1	1	1	6	133.8812	0	0	0
81	2	6	0.01	1	0.07	73	5	4	1	0	1	7	75.7169	0	0	0
82	-2	14	0.01	6	0.1	50	45	4	9	0	0	8	2.0116	0.8194	0.0041	0.6413
83	-2	14	0.01	6	0.1	150	5	4	1	0	1	3	3.2137	0	0	0
84	-2	6	0.01	1	0.1	150	9	14	9	1	1	1	2.1864	1	0	1
85	-2	6	0.01	2.6666667	0.01	150	45	4	9	1	0	2	5.4065	0.017	0.015	0.0046
86	2	6	0.01	1	0.1	50	45	4	1	1	0	1	2.083	1	0.0014	0
87	-2	6	0.01	1	0.01	50	18	4	1	0	0	4	2.6287	1	0.0533	0
88	2	6	0.01	3.2222222	0.01	50	5	8.5081415	1	1	0	5	3.262	1	0.072	0.3555
89	2	6	0.01	6	0.01	50	45	4	9	1	0	6	114.0467	0.9757	0.0966	0.0811
90	2	12.222222	0.01	6	0.1	50	32	8.4444444	9	0	0	7	78.1869	0.7949	0.0024	0.6294
91	2	10.444444	0.01	1	0.1	150	18	4	9	1	1	8	3.0974	0.6364	0.0037	0.6203
92	-2	14	0.1	1	0.01	50	5	4	1	0	1	2	12.753	0	0	0
93	-2	6	0.1	1	0.01	116	5	14	9	0	0	2	5.652	0.017	0.0144	0.0048
94	-1	6	0.01	4.3333333	0.01	50	45	14	9	0	0	1	1.3907	1	0.0466	0
95	-2	14	0.01	6	0.1	94	5	14	9	0	1	4	2.5694	1	0	1
96	-2	6	0.01	6	0.01	150	5	14	9	0	0	5	2.1182	0.9838	0.0204	0.6009
97	2	6	0.1	1	0.01	150	5	4	9	0	1	6	114.5794	0.9675	0.0153	0.4408
98	-2	14	0.01	6	0.1	150	5	14	1	0	0	7	2.799	0.6351	0.0011	0.7402
99	-2	9.5555556	0.1	6	0.01	150	45	14	5	0	0	8	1.6474	0.9609	0.0555	0.1604
100	-2	6	0.01	1	0.1	50	45	4	9	1	1	2	8.5107	0.1568	0.001	0.3814
101	2	7.7777778	0.1	1	0.01	150	45	10.666667	9	1	1	1	2.9306	1	0	1
102	-2	6	0.1	1	0.0699764	150	5	4	1	0	1	4	1.7776	1	0	1
103	2	14	0.01	6	0.1	150	5	14	1	1	1	5	15.3021	0	0	0
104	-1	6	0.01	1	0.01	50	45	7.3333333	1	1	1	6	148.0331	0	0	0
105	2	14	0.01	6	0.01	150	45	4	9	1	1	7	68.5278	0.7101	0.0121	0.3135
106	2	6	0.08	1	0.01	150	5	14	1	1	1	8	15.7267	0	0	0
107	1	11.387844	0.1	1	0.01	50	45	4	9	1	0	3	2.7408	0.9591	0.0145	0.716
108	2	6	0.1	6	0.1	150	5	4	1	0	0	3	4.2006	0.4293	0.001	0.9389
109	-2	14	0.01	6	0.04	50	45	4	9	1	1	3	3.4	0.858	0	1
110	2	6	0.07	1	0.1	150	5	4	1	1	1	2	20.3076	0	0	0
111	2	14	0.01	1	0.01	150	5	4	6	1	0	1	1.8657	1	0	1
112	2	14	0.1	1	0.0299968	150	45	14	9	1	1	4	2.4199	1	0	1
113	2	14	0.01	1	0.1	150	45	14	1	1	0	5	3.1524	0.9093	0.0005	0.9761
114	2	14	0.1	6	0.01	150	45	4	1	0	1	6	161.8296	0	0	0
115	-2	6	0.01	1	0.01	50	5	14	9	0	0	7	2.7577	0.8844	0.0859	0.0551
116	2	14	0.1	1	0.1	150	45	4	1	0	0	8	2.4057	0.7971	0.0035	0.6587
117	-2	14	0.1	1	0.1	50	5	4	5	0	0	3	2.7715	0.4518	0	0.9979
118	2	6	0.1	1	0.07	150	45	4	5	1	1	3	7.6229	0.473	0.0025	0.8761
119	2	6	0.1	2.6666667	0.1	50	45	4	9	0	0	2	4.2561	0.0085	0.0021	0.0165
120	-2	6	0.01	6	0.01	107	5	14	1	1	1	1	5.3885	1	0	1
121	-2	14	0.1	1	0.01	50	45	14	9	0	0	4	26.0713	1	0	1
122	2	14	0.1	6	0.1	50	5	14	9	0	0	5	2.9468	0.8585	0.0006	0.9726
123	2	6	0.01	1	0.1	150	45	4	1	0	0	6	115.0929	0.8845	0.0051	0.5501
124	2	14	0.1	1	0.1	150	5	7.3333333	9	1	0	7	73.0666	0.8165	0.0038	0.5287
125	2	6	0.1	5.4444444	0.1	150	5	14	9	0	1	8	3.9271	0.7688	0.0035	0.6833
126	-2	6	0.01	2.6666667	0.1	150	45	4	9	0	0	3	2.6997	0.4518	0.0011	0.9343
127	2	6	0.01	6	0.1	50	5	4	1	1	1	4	3.8197	1	0	1
128	-2	6	0.1	6	0.01	50	5	4	9	0	1	5	2.9034	0.9163	0.0117	0.7462
129	-2	6	0.1	3.7777778	0.01	50	5	4	6	1	0	1	1.162	1	0	1
130	2	14	0.01	6	0.0692935	150	45	14	1	0	0	4	2.37	1	0	1
131	-2	6	0.06	6	0.1	50	45	8.4444444	5	1	0	5	1.6472	0.9011	0.0011	0.9527
132	-2	14	0.01	1	0.01	50	5	4	9	1	0	6	95.7794	0.9653	0.0538	0.125
133	2	6	0.059493	6	0.02	117	9	14	9	1	0	7	60.5903	0.9048	0.0311	0.1378
134	2	14	0.01	1	0.01	50	45	4	3	1	0	8	2.3949	0.9581	0.0879	0.1139
135	2	14	0.01	6	0.01	150	45	14	9	0	0	3	3.4453	0.9663	0.0053	0.8741
136	2	14	0.1	1	0.01	150	27	14	1	1	1	3	20.398	0	0	0
137	2	14	0.04	1	0.01	50	45	7.3333333	1	1	0	2	4.9915	0	0.0186	0
138	-2	14	0.1	6	0.01	50	45	10.665771	1	1	0	1	1.3248	1	0	1
139	2	6	0.01	3.2222222	0.01	150	5	14	9	0	0	4	2.4645	1	0.1135	0
140	2	6	0.1	1	0.1	150	5	4	9	1	0	5	3.1028	0.9126	0.0011	0.9534
141	-2	13.111111	0.01	6	0.1	50	45	14	1	1	0	6	100.3038	0.8638	0.0019	0.7561
142	2	6	0.01	6	0.1	150	45	4	1	1	0	7	64.2793	0.7922	0.0048	0.4519
143	2	6	0.1	6	0.1	50	32	4	1	1	0	8	2.7378	0.782	0.0125	0.3377
144	-1	14	0.01	1	0.1	50	45	14	1	0	1	3	10.0917	0	0	0
145	-2	6	0.09	1	0.1	50	5	4	1	1	1	3	8.6633	0	0	0
146	-2	14	0.1	1	0.1	150	45	14	3	1	0	2	6.8088	0	0	0
147	-2	14	0.1	6	0.01	150	28	4	9	0	0	1	1.345	1	0	1
148	2	14	0.1	1	0.01	150	5	4	1	1	0	4	4.0828	1	0	1
149	-2	6	0.01	1	0.1	150	45	4	1	1	1	5	22.7063	0	0	0
150	2	14	0.01	1	0.1	128	45	14	9	1	1	6	122.5947	0.8355	0.001	0.8696
151	0	6	0.1	6	0.1	50	5	4	1	1	0	7	5.4724	0.7733	0.0016	0.6988
152	0	14	0.06	1	0.1	50	14	14	9	1	0	8	1.8998	0.7914	0.0057	0.5446
153	-2	6	0.07	1.5555556	0.01	106	45	14	9	0	1	3	5.241	0.6205	0.0067	0.8036
154	1	14	0.01	2.1111111	0.1	150	5	14	9	0	0	2	3.898	0	0.001	0
155	2	6	0.01	6	0.1	150	5	6.3571644	9	0	1	1	2.0125	1	0.0011	0
156	2	14	0.01	1	0.1	106	45	4	9	0	1	4	2.2467	1	0	1
157	-2	14	0.1	5.4444444	0.1	150	5	4	1	0	0	5	2.9141	0.8642	0.0005	0.9765
158	-2	14	0.1	1	0.1	50	45	6.2222222	9	0	0	6	99.8503	0.8638	0.0007	0.9
159	0	6	0.1	1	0.08	150	45	14	9	0	0	7	5.6176	0.8205	0.0012	0.7711
160	2	12.222222	0.01	6	0.01	150	5	4	1	0	0	8	1.8924	0.9545	0.0661	0.1355
161	-2	14	0.01	1	0.01	150	45	14	9	1	0	8	2.1229	0.9545	0.0815	0.1128
162	-2	11.23182	0.01	6	0.02125	50	5	4	1	0	1	2	8.9165	0	0	0
163	-2	11.659824	0.1	1	0.01	150	45	6.5595674	2	0	1	2	8.0544	0	0.0074	0
164	-2	6	0.0212614	6	0.0881126	150	40	12.749848	1	0	0	3	2.9558	0.4794	0.0013	0.9295
165	0	10.253087	0.0662487	3.3682634	0.0537223	112	21	7.956887	4	0	0	7	6.7704	0.8494	0.0027	0.6295

166	-1	14	0.086875	6	0.01	150	5	4	2	1	1	8	2.1842	0.9179	0.0673	0.1484
167	2	14	0.1	6	0.1	150	40	10.24523	1	1	1	8	9.542	0	0	0
168	0	10	0.055	3.5	0.055	100	25	9	5	1	0	3	4.1282	0.8826	0.0018	0.9474
169	0	10	0.055	3.5	0.055	100	25	9	5	0	0	3	4.7791	0.8825	0.0018	0.9483
170	0	10	0.055	3.5	0.055	100	25	9	5	1	1	3	3.9142	0.9428	0.0017	0.9539
171	0	10	0.055	3.5	0.055	100	25	9	5	0	1	3	5.6731	0.9428	0.0017	0.9539
172	0	10	0.055	3.5	0.055	100	25	9	5	1	0	2	4.4714	0.6218	0.002	0.5585
173	0	10	0.055	3.5	0.055	100	25	9	5	0	0	2	5.0044	0.6218	0.0019	0.5759
174	0	10	0.055	3.5	0.055	100	25	9	5	1	1	2	6.5717	0.3362	0.0028	0.3278
175	0	10	0.055	3.5	0.055	100	25	9	5	0	1	2	7.7384	0.3362	0.0019	0.4202
176	0	10	0.055	3.5	0.055	100	25	9	5	1	0	1	2.3899	1	0	1
177	0	10	0.055	3.5	0.055	100	25	9	5	0	0	1	1.366	1	0	1
178	0	10	0.055	3.5	0.055	100	25	9	5	1	1	1	1.5475	1	0	1
179	0	10	0.055	3.5	0.055	100	25	9	5	0	1	1	1.6072	1	0	1
180	0	10	0.055	3.5	0.055	100	25	9	5	1	0	4	32.5788	1	0.0087	0
181	0	10	0.055	3.5	0.055	100	25	9	5	0	0	4	2.2557	1	0.0065	0
182	0	10	0.055	3.5	0.055	100	25	9	5	1	1	4	5.1739	1	0.0042	0
183	0	10	0.055	3.5	0.055	100	25	9	5	0	1	4	35.4509	1	0.0054	0
184	0	10	0.055	3.5	0.055	100	25	9	5	1	0	5	2.2587	0.9631	0.002	0.9272
185	0	10	0.055	3.5	0.055	100	25	9	5	0	0	5	2.046	0.9416	0.0014	0.9449
186	0	10	0.055	3.5	0.055	100	25	9	5	1	1	5	3.8076	0.8473	0.0001	0.9964
187	0	10	0.055	3.5	0.055	100	25	9	5	0	1	5	3.3818	0.8429	0.0001	0.9963
188	0	10	0.055	3.5	0.055	100	25	9	5	1	0	6	120.2659	0.9167	0.0163	0.2862
189	0	10	0.055	3.5	0.055	100	25	9	5	0	0	6	112.778	0.9194	0.0038	0.6299
190	0	10	0.055	3.5	0.055	100	25	9	5	1	1	6	116.2107	0.9548	0.0031	0.7456
191	0	10	0.055	3.5	0.055	100	25	9	5	0	1	6	123.3334	0.9644	0.0007	0.9312
192	0	10	0.055	3.5	0.055	100	25	9	5	1	0	7	6.4612	0.8571	0.0049	0.4792
193	0	10	0.055	3.5	0.055	100	25	9	5	0	0	7	3.3506	0.8385	0.002	0.6888
194	0	10	0.055	3.5	0.055	100	25	9	5	1	1	7	5.7254	0.8368	0.0026	0.6709
195	0	10	0.055	3.5	0.055	100	25	9	5	0	1	7	5.2963	0.7892	0.0003	0.9359
196	0	10	0.055	3.5	0.055	100	25	9	5	1	0	8	26.4152	0.8667	0.014	0.3641
197	0	10	0.055	3.5	0.055	100	25	9	5	0	0	8	1.9213	0.8839	0.0058	0.5931
198	0	10	0.055	3.5	0.055	100	25	9	5	1	1	8	28.5367	0.7784	0.0065	0.5898
199	0	10	0.055	3.5	0.055	100	25	9	5	0	1	8	27.4152	0.7737	0.006	0.6025
200	2	6	0.1	1	0.01	150	5	4	9	0	1	6	115.3771	0.9723	0.0158	0.4145
201	-2	14	0.1	1	0.1	150	5	14	1	0	1	6	112.049	0	0	0
202	2	14	0.1	6	0.01	150	45	4	1	0	1	6	161.5426	0	0	0
203	-2	6	0.1	6	0.1	50	45	4	1	0	1	1	1.2303	1	0	1
204	-2	6	0.1	6	0.01	150	5	10.666667	1	0	1	7	3.5503	0	0	0
205	2	6	0.01	6	0.1	150	5	6.3571644	9	0	1	1	2.2722	1	0	1
206	-2	14	0.01	6	0.1	94	5	14	9	0	1	4	1.6816	1	0	1

Table B.1 Combined Array Control Levels and Raw Responses

Standardized Total Response =			M[1]	M[2]	M[3]	M[4]	M[5]	M[6]	M[7]	M[8]		
0.928732608			0.112710268	0.117218679	0.1262355	0.112710268	0.117218679	0.108201857	0.112710268	0.121727089		0.928732608
-0.16093589	* A		-0.019531055	-0.020312297	-0.021874781	-0.019531055	-0.020312297	-0.018749812	-0.019531055	-0.021093539		-0.16093589
0.287762309	* B		0.03492261	0.036319515	0.039113324	0.03492261	0.036319515	0.033525706	0.03492261	0.037716419		0.287762309
0.18357479	* C		0.022278494	0.023169634	0.024951913	0.022278494	0.023169634	0.021387354	0.022278494	0.024060773		0.18357479
0.118276589	* D		0.014353955	0.014928113	0.01607643	0.014353955	0.014928113	0.013779797	0.014353955	0.015502271		0.118276589
0.622239684	* E		0.075514525	0.078535106	0.084576268	0.075514525	0.078535106	0.072493944	0.075514525	0.081555687		0.622239684
0.047485806	* F		0.00576284	0.005993354	0.006454381	0.00576284	0.005993354	0.005532327	0.00576284	0.006223868		0.047485806
-0.059166689	* G		-0.007180423	-0.00746764	-0.008042074	-0.007180423	-0.00746764	-0.006893207	-0.007180423	-0.007754857		-0.059166689
0.021716595	* H		0.002635509	0.002740929	0.00295177	0.002635509	0.002740929	0.002530089	0.002635509	0.00284635		0.021716595
0.365644744	* J		0.044374362	0.046149337	0.049699286	0.044374362	0.046149337	0.042599388	0.044374362	0.047924311		0.365644744
0.076358805	* K		0.009266845	0.009637519	0.010378867	0.009266845	0.009637519	0.008896171	0.009266845	0.010008193		0.076358805
-0.160423161	* L		-0.01946883	-0.020247583	-0.02180509	-0.01946883	-0.020247583	-0.018690077	-0.01946883	-0.021026337		-0.160423161
0.774824531	* M[1]		0.094032103	0	0	0	0	0	0	0		0.094032103
-1.779421789	* M[2]		0	-0.224587216	0	0	0	0	0	0		-0.224587216
2.456865236	* M[3]		0	0	0.333942848	0	0	0	0	0		0.333942848
1.464838509	* M[4]		0	0	0	0.177771664	0	0	0	0		0.177771664
1.22827625	* M[5]		0	0	0	0	0.155025158	0	0	0		0.155025158
-2.906496946	* M[6]		0	0	0	0	0	-0.338621003	0	0		-0.338621003
-0.28650865	* M[7]		0	0	0	0	0	0	-0.034770467	0		-0.034770467
-0.29846376	* BE		-0.03622133	-0.037670183	-0.04056789	-0.03622133	-0.037670183	-0.034772477	-0.03622133	-0.039119036		-0.29846376
-0.145106798	* BM[1]		-0.017610048	0	0	0	0	0	0	0		-0.017610048
-0.609422884	* BM[2]		0	-0.076917451	0	0	0	0	0	0		-0.076917451
0.050601077	* BM[3]		0	0	0.006877816	0	0	0	0	0		0.006877816
1.104654031	* BM[4]		0	0	0	0.134059955	0	0	0	0		0.134059955
0.391108084	* BM[5]		0	0	0	0	0.049363156	0	0	0		0.049363156
-0.258359334	* BM[6]		0	0	0	0	0	-0.030100117	0	0		-0.030100117
0.165166983	* BM[7]		0	0	0	0	0	0	0.020044537	0		0.020044537
-0.661393958	* EM[1]		-0.080266257	0	0	0	0	0	0	0		-0.080266257
-0.21250146	* EM[2]		0	-0.026820573	0	0	0	0	0	0		-0.026820573
-0.483520254	* EM[3]		0	0	-0.0657212	0	0	0	0	0		-0.0657212
0.220174878	* EM[4]		0	0	0	0.026720252	0	0	0	0		0.026720252
-0.493187564	* EM[5]		0	0	0	0	-0.062246974	0	0	0		-0.062246974
0.435434061	* EM[6]		0	0	0	0	0	0.050730182	0	0		0.050730182
0.235208103	* EM[7]		0	0	0	0	0	0	0.028544673	0		0.028544673
0.519721233	* JM[1]		0.063072965	0	0	0	0	0	0	0		0.063072965
-0.185781319	* JM[2]		0	-0.023448128	0	0	0	0	0	0		-0.023448128
-0.688586044	* JM[3]		0	0	-0.09359422	0	0	0	0	0		-0.09359422
-1.094824113	* JM[4]		0	0	0	-0.132867004	0	0	0	0		-0.132867004
0.459949215	* JM[5]		0	0	0	0	0.058051843	0	0	0		0.058051843
0.782221794	* JM[6]		0	0	0	0	0	0.091132636	0	0		0.091132636
0.01039305	* JM[7]		0	0	0	0	0	0	0.001261292	0		0.001261292
-1.197693658	* J^2		-0.145351172	-0.151165219	-0.162793313	-0.145351172	-0.151165219	-0.139537125	-0.145351172	-0.156979266		-1.197693658

Figure B.1 Table lays out steps for developing the Mean Model from the General Model

Standardized Total Response =	
1.091525694	
-0.16093589	* A
0.373480157	* B
0.18357479	* C
0.118276589	* D
0.493179787	* E
0.047485806	* F
-0.059166689	* G
0.021716595	* H
0.32925413	* J
0.076358805	* K
-0.160423161	* L
-0.29846376	* BE
-1.197693658	* J^2

Figure B.2 Reduced Mean Model

Appendix C. Code for AutoGAD and Iterative Master Function

The following Appendix contains MATLAB® code for executing the AutoGAD algorithm as well as code for the master function used to feed parameters to and record responses from AutoGAD. It should be noted that the AutoGAD code was modified slightly to enable recording the results of hundreds of sequential replications.

```
%This is a modified AutoGAD script for use in RPD experiments where a
%parameter matrix is used to feed multiple runs of AutoGAD iteratively and
%record the results for analysis
%
%Mods by: Capt Matt Davis
%Jan 2009

%*********************************************************************%
%AutoGAD version 1.0                                                  %
%                                                                     %
%                                                                     %
%Hyperspectral Autonomous Global Anomaly Detector (AutoGAD)           %
%Using FastICA                                                        %
%                                                                     %
%Author: Capt Robert Joseph Johnson                                   %
%Feb 2008                                                             %
%*********************************************************************%



%Tactical Decisions By User-----------------------------------------------
functn=params(10);%objective function in ICA to use.  Options [1=tanh, 2=pow3]
orthogonalization=params(11);%find ICs in parallel (symm) or one by one (delf).
%Options [symm=1, defl=2]
dim_adjustment=params(1);%how much to adjust max distance log scale secant line (MDLS)
%dimensionality decision
max_score_thresh=params(2);%threshold above which decision is made to declare target
bin_width_SNR=params(3);%bin width when using zero-detection histogram method to
%determine breakpoint between background and potential targets for
%calculating potential target SNR (PT SNR)
PT_SNR_thresh=params(4);%2;%threshold above which decision is made to declare target
bin_width_ident=params(5);%bin width when using zero-detection histogram method to
%determine breakpoint between background and targets for identifying target
%pixels from selected target signals
threshold_both_sides=params(12);%1=identifiy outliers on both sides of IC signal,
%0=identify ouliers on side with highest magnitude scores only
clean_sig=params(13);%0 = no signal smoothing, 1 = signal smoothing prior to target
%identification
smooth_iter_high=params(6);%number of iterations to complete for iterative smoothing
%of low SNR object
smooth_iter_low=params(7);%20;%number of iterations to complete for iterative smoothing
%of high SNR object
low_SNR=params(8);%Threshold decision for choosing smooth_iter_low or smooth_iter_high
window_size=params(9);%image window size for smoothing
show_plots=2;%1=yes, 2=no
%-----------------------------------------------------------------------

switch num2str(functn)
    case '1'
        funct='tanh';
    case '2'
        funct='pow3';
end

switch num2str(orthogonalization)
    case '1'
        orthog='symm';
    case '2'
        orthog='defl';
end
```

```
switch num2str(params(14))
    case '1'
        temp1 = 'ARES1C';
        temp3 = 'ARES1C_mask';
    case '2'
        temp1 = 'ARES1D';
        temp3 = 'ARES1D_mask';
    case '3'
        temp1 = 'ARES1F';
        temp3 = 'ARES1F_mask';
    case '4'
        temp1 = 'ARES2C';
        temp3 = 'ARES2C_mask';
    case '5'
        temp1 = 'ARES2D';
        temp3 = 'ARES2D_mask';
    case '6'
        temp1 = 'ARES2F';
        temp3 = 'ARES2F_mask';
    case '7'
        temp1 = 'ARES3F';
        temp3 = 'ARES3F_mask';
    case '8'
        temp1 = 'ARES4F';
        temp3 = 'ARES4F_mask';
end
%--------------Solicit User Input to Load HSI Image File-------------------
%display('This program requires the Image Processing Toolbox for MATLAB.');
%display('Make sure your version of MATLAB has this toolbox.');
%display('  ');
%display('Make sure you have in your working directory the all the files for');
%display('FastICA and the Center_and_PCA.m file');
%display('   ');
%display('The first several lines in the AutoGAD algorithm detail default');
%display('settings for AutoGAD.  If you would like to experiment');
%display('changing these settings, hit ctrl c to interrupt this run.  Open');
%display('up AutoGAD in the the editor and make changes.');
%display('   ');
%display('Please hit enter');
%display('  ');
%answer=input('');
%display('Enter you image cube file name to be processed.');
%display('File should be in .mat format ');
%display('  ');
%display('!Make sure to put it in single quotes!')
%display('!Make sure the image cube is in the same directory as this code!');
%display('  ');
%temp1=input('');
temp2=struct2cell(load(temp1));
im_cube=temp2{1};
%display('   ');
%display ('Enter truth mask');
%display('  ');
%display('If you do not have a truth mask and this is a real target search');
%display('with no truth knowledge, enter 0');
%display('  ');
%temp3=input('');
if temp3~=0;
    temp4=struct2cell(load(temp3));
    truth=temp4{1};
end
```

```
clear temp1
clear temp2
clear temp4
%clc;
%display('   ');
%display('Please enter the good bands for this HSI sensor');
%display('These are the bands that are NOT the atmospheric absorption bands');
%display('  ');
%display('If this the the 210 band HYDICE sensor, LtCol Tim Smetek concluded');
%display('that the good_bands = [5:72, 78:85, 92:99, 116:134,158:199]');
%display(' ');
%display('If this is HYDICE data and you would like to keep these bands, type');
%display('1 and hit enter');
%display('   ');
%display('If this is not HYDICE data or you do not want to keep those bands');
%display('just hit enter and then enter the bands you wish to keep');
%display('  ');
answer=1; %input('');
if answer==1
    good_bands=[5:72,78:85,92:99,116:134,158:199];
else
    good_bands=input('good_bands = ');
end
%-------------------------------------------------------------------------


%-----------Ask User if they want to see color image-----------------------
%display('  ');
%display('Do you want to see a RGB image of your HSI file?');
%display('  ');
%display('If so, enter 1. If not just hit enter.          ');
%display('   ');
answer= 2; %input('');
if answer==1
    Red=input('Please enter the band number for red, HYDICE is 50       ');
    display(' ');
    Green=input('Please enter the band number for green, HYDICE is 29     ');
    display('  ');
    Blue=input('Please enter the band number for blue, HYDICE is 22      ');

    R=im_cube(:,:,Red);
    G=im_cube(:,:,Green);
    B=im_cube(:,:,Blue);

    %Borrowed from Lt Col Tim Smetek, lines 142 - 163, offer a way to make
    %an RGB image look better.  The following lines are used in conjunction
    %with the mat2gray function to perform a 2% linear stretch on the image
    %data

    m1=size(R,1);
    n=size(R,2);
    low_id=floor(0.02*m1*n);
    hi_id=floor(0.98*m1*n);

    r_vec=reshape(R,m1*n,1);
    r_vec=sort(r_vec);
    r_vec=double(r_vec);
    min_R=r_vec(low_id);
    max_R=r_vec(hi_id);

    g_vec=reshape(G,m1*n,1);
```

```
    g_vec=sort(g_vec);
    g_vec=double(g_vec);
    min_G=g_vec(low_id);
    max_G=g_vec(hi_id);

    b_vec=reshape(B,m1*n,1);
    b_vec=sort(b_vec);
    b_vec=double(b_vec);
    min_B=b_vec(low_id);
    max_B=b_vec(hi_id);

    %The IPT function mat2gray to scales the values in each matrix between 0
    %and 1.  This is necessary because the matrices are of type double and
    %imshow requires double value matrices to be scaled between 0 and 1

    R=mat2gray(double(R),[min_R max_R]);
    G=mat2gray(double(G),[min_G max_G]);
    B=mat2gray(double(B),[min_B max_B]);

    %**Now stack the three matrices into a 3D array and display the image
    RGB=cat(3,R,G,B);
    figure (1)
    imshow(RGB,[]);
    title('True Color Image');
    impixelinfo;
    %**Turn-on the interactive pixel value utility
    clear R G B
    clear RGB
    clear r_vec g_vec b_vec
end
%--------------------------------------------------------------------------


tic;
%----Resize Image Cube into matrix where each row is a pixels--------------
%------------------signature in the spectral bands--------------------------
dims=size(im_cube,3);
num_pixels=size(im_cube,1)*size(im_cube,2);
num_lines=size(im_cube,1);
num_col=size(im_cube,2);

%**Place all the pixel vectors into a single matrix where each row
%corresponds to a pixel vector
data_matrix=zeros(num_pixels,dims);
data_matrix_truth=zeros(num_pixels, 1);
for x=1:dims
    data_matrix(:,x)=reshape(im_cube(:,:,x),num_pixels,1);
end
clear im_cube;
%If HSI cube is too large for MATLAB since MATLAB converts variables to
%double precision, this will make file smaller so that MATLAB can
%operate on it.
if num_pixels*dims > 25*10^6
    data_matrix=single(data_matrix);
end
%%%%%%%%%%%%%%%%%

if temp3~=0;
    data_matrix_truth=reshape(truth,num_pixels,1);
end
%--------------------------------------------------------------------------
```

```
%----------Keep bands that are not atmospheric absorption bands-----------
data_matrix_new=data_matrix(:,good_bands);
dims=size(data_matrix_new,2);
clear data_matrix;
%------------------------------------------------------------------------

%----------Set negative pixel values = 0 (remove bad pixels) -------------
[m,n] = size(data_matrix_new);
for i =1:m
    for j= 1:n
        if data_matrix_new(i,j) < 0
            data_matrix_new(i,j) = 0;
        end
    end
end
%------------------------------------------------------------------------

%------------------------------Perform PCA--------------------------------
[Ac,Lc,TotVarCompC,YscorC]=Center_and_PCA(data_matrix_new);
%Function written by Capt Johnson does PCA on covariance matrix

Lplot=diag(Lc);
%checks for eigenvalues 10^-4 and smaller and moves the endpoint of the
%eigenvalue curve to the point where eigenvalues are greater than 10^-4
%so that the MDSL method in the next section is not biased by pathological
%cases where the endpoint of the log scale eigenvalue curve has extremely
%small endpoints and grossly alters the theoretical shape of the curve that
%should arise for eigenvalues of covariance matrices of spectral data
%that follow the LMM
while Lplot(dims)<=10^-4;
    dims=dims-1;
end
L=log10(Lplot);
clear data_matrix_new;
clear Ac;
clear Lc;
%------------------------------------------------------------------------


%---------------------Dimensionality Assessment---------------------------
%slope of line connecting endpoints of scree plot of eigenvalues
m_slope = (L(1)- L(dims))/(1-dims);

%calculate Euclidean distances from scree plot curve to line connecting
%endpoints
Eqdist=[];
for i=1:dims
    x_int=(L(i) - L(1)+ m_slope + (i/m_slope))/(m_slope + (1/m_slope));
    y_int=L(1)+ m_slope*(x_int-1);
    Eqdist(i)=sqrt((i-x_int)^2+(L(i)-y_int)^2);
end
%find the point on the log scale eigencurve curve with the largest distance
%from the line connecting the endpoints
[max_Eqdist, index_dim]=max(Eqdist);
reduced_dim = index_dim;
k=reduced_dim-1;
k=k+dim_adjustment;
percent_var=TotVarCompC(k,1);
Y=YscorC(:,1:k);
```

```matlab
clear YscorC;
if show_plots==1
    figure(3);
    semilogy(Lplot(1:dims), '.-');
    title({'Plot of Eigenvalue vs. PC Component',...
        sprintf('Dimensionality = %i',k)},'fontweight','b');
end
%-----------------------------------------------------------------------------


%---------------------Perform ICA on reduced PCA space---------------------
[icasig, A, W]=fastica(Y','approach',orthog, 'g', funct, 'epsilon',...
    .00001, 'stabilization','on', 'verbose','off');
icasig=icasig';
%If an IC score has a high signals, make them always positive
for j=1:k
    if abs(min(icasig(:,j)))>max(icasig(:,j))
        icasig(:,j)=-icasig(:,j);
    end
end
clear Y
%-----------------------------------------------------------------------------


%--------------------Find the Kurtosis of Each Signal-----------------------
kurt=zeros(k,1);
for j=1:k
    kurt(j)=abs(kurtosis(icasig(:,j)));
end
%this statistic will not be used in AutoGAD, but is included if the user
%wishes to compare this value to the PT SNR and max pixel score values
%-----------------------------------------------------------------------------

%--------------------Find the Max Score of Each Signal---------------------
maxim=zeros(k,1);
for j=1:k
    maxim(j)=max(icasig(:,j));
end
%-----------------------------------------------------------------------------


%---------------------Find the PT SNR of each signal-----------------------
for j=1:k
    bins=[];
    freq=[];
    bins=min(icasig(:,j)):bin_width_SNR:max(icasig(:,j));
    freq=hist(icasig(:,j),bins);
    count=1;
    %find the bin that is at center (mean) of the ICA signal
    for i=1:size(bins,2)
        if bins(i)<0
            count=count+1;
        else
            break
        end
    end
    %from the center of the signal keep counting until the first zero
    %bin is found
    count1=1;
    for i=count+1:size(freq,2)
        if freq(i)> 0;
```

```
            count1=count1+1;
        else
            break
        end
    end
    %if there are no zero bins until the very end of the tail then the
    %threshpoint is set above the last data point
    if count+count1 > size(bins,2)
        thresh_pt(j)=max(icasig(:,j));
    else
    %otherwise use the first bin were a zero value occurs
        thresh_pt(j)=bins(count+count1);
    end
end
PT_SNR=zeros(k,1);
for j=1:k
    potent_target=[];
    potent_bkrd=[];
    %find the indices of those pixels greater than threshold
    ind = icasig(:,j)>thresh_pt(j);
    %store those pixels greater than threshold in vector
    potent_target=icasig(ind,j);
    if size(potent_target,1)==0
        potent_target=0;
    end
    %find the indices of those pixels less than threshold
    ind2 = icasig(:,j)<=thresh_pt(j);
    %store those pixels less than threshold in vector
    potent_bkrd=icasig(ind2,j);
    power_target(j)=var(potent_target);
    power_bkrd(j)=var(potent_bkrd);
    PT_SNR(j)=10*log10(power_target(j)/power_bkrd(j));
end
%--------------------------------------------------------------------------
one=ones(num_pixels,1);


%---Plot Abundance Maps from ICs Frames with PT SNR and Max Pixel Score----
if show_plots==1
    figure (4)
    d=ceil(sqrt(k));
    for j=1:k
        subplot(d,d,j)
        ICsig(:,:,j)=reshape(icasig(:,j),num_lines,num_col);
        ICsig_grey(:,:,j)=mat2gray(double(ICsig(:,:,j)));
        imshow(ICsig_grey(:,:,j));
        if maxim(j)>=max_score_thresh && PT_SNR(j)>=PT_SNR_thresh
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',j,PT_SNR(j)...
                ,maxim(j)),'Potential Target'},'fontweight','b');
        else
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',j,PT_SNR(j)...
                ,maxim(j)),'Non-Target'},'fontweight','b');
        end
    end
    clear ICsig;
    clear ICsig_grey;
%--------------------------------------------------------------------------


%---------------------------Plot IC signals--------------------------------
    figure(5)
```

```
    PT_SNR_line=[];
    for j=1:k
        PT_SNR_line(:,j)=thresh_pt(j)*one;
    end
    for j=1:k
        subplot(d,d,j)
        plot(icasig(:,j),'.', 'MarkerEdgeColor','r');
        hold on
        plot(PT_SNR_line(:,j),'LineWidth',2);
        xlabel('Pixel');
        ylabel('Abundance (IC Score)');
        if maxim(j)>=max_score_thresh && PT_SNR(j)>=PT_SNR_thresh
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',j,PT_SNR(j)...
                ,maxim(j)),'Potential Target'},'fontweight','b');
        else
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',j,PT_SNR(j)...
                ,maxim(j)),'Non-Target'},'fontweight','b');
        end
        axis([0,num_pixels,-10,30]);
    end
    clear PT_SNR_line
%---------------------------------------------------------------------------
end

%-----------------Keep only Those Signals Above Both Thresholds-------------
ind_max=[];
ind_SNR=[];
ind_both=[];
ind_max = maxim>=max_score_thresh;
ind_SNR = PT_SNR>=PT_SNR_thresh;
ind_both=ind_max+ind_SNR;
[rind,cind]= find(ind_both==2);
if size(rind,1)==0
    display('NO TARGETS')
    target_sig=zeros(num_pixels,1);
    target_vec=zeros(num_pixels,1);
else
    target_sig=icasig(:,rind);
end
clear icasig;
num_tgt_maps=size(target_sig,2);
for j=1:num_tgt_maps
    tgt_sig_map(:,:,j)=reshape(target_sig(:,j),num_lines,num_col);
end
%---------------------------------------------------------------------------
target_sig_clean=[]; %Place here to make available outside if statement --mtd
if size(rind,1)~=0
%-------------Show Abundance Maps of Retained Target Signals---------------
    if show_plots==1
        d=ceil(sqrt(num_tgt_maps));
        tgt_gray=[];
        figure(6)
        for j=1:num_tgt_maps
            subplot(d,d,j);
            tgt_sig_map_gray(:,:,j)=mat2gray(tgt_sig_map(:,:,j));
            imshow(tgt_sig_map_gray(:,:,j));
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',rind(j),...
                PT_SNR(rind(j)),maxim(rind(j))),'Potential Target'},...
                'fontweight','b');
        end
        clear tgt_sig_map_gray
```

```
    end
    clear target_sig
%-----------------------------------------------------------------------------


%----Clean (IAN Filtering)Target Signals prior to Identification-----------
    if clean_sig==1
        for j=1:num_tgt_maps
            if PT_SNR(rind(j))<low_SNR
                for c=1:smooth_iter_high
                    [tgt_sig_map(:,:,j)]=wiener2(tgt_sig_map(:,:,j), ...
                        [window_size,window_size]);
                end
            else
                for c=1:smooth_iter_low
                    [tgt_sig_map(:,:,j)]=wiener2(tgt_sig_map(:,:,j), ...
                        [window_size,window_size]);
                end
            end
        end
%-----------------------------------------------------------------------------


%-------------------Plot IAN Filtered Target Maps--------------------------
        if show_plots==1
            for j=1:num_tgt_maps
                clean_map_gray(:,:,j)=mat2gray(tgt_sig_map(:,:,j));
            end
            figure(7)
            for j=1:num_tgt_maps
                subplot(d,d,j);
                imshow(clean_map_gray(:,:,j));
                title(sprintf('Filtered Map %i',rind(j)),'fontweight','b');
            end
        end
    end
%-----------------------------------------------------------------------------


%----------Identify Target Pixels from Selected Target Maps----------------
%-----------------------------------------------------------------------------
%Move from 527 to 470
%target_sig_clean=[];
    for j=1:num_tgt_maps
        target_sig_clean(:,j)=reshape(tgt_sig_map(:,:,j), num_pixels, 1);
    end
    for j=1:num_tgt_maps
        bins=[];
        freq=[];
        bins=(min(target_sig_clean(:,j))):bin_width_ident:...
            max(target_sig_clean(:,j));
        freq=hist(target_sig_clean(:,j),bins);
        count=1;
        %find the bin that is at center (mean) of the ICA signal
        for i=1:size(bins,2)
            if bins(i)<0
                count=count+1;
            else
                break
            end
        end
```

```
        %from the center of the signal keep counting until the first zero
        %bin is found
        count1=1;
        for i=count+1:size(freq,2)
            if freq(i)> 0;
                count1=count1+1;
            else
                break
            end
        end
        %if there are no zero bins until the very end of the tail then the
        %threshpoint is set above the last data point
        if count+count1 > size(bins,2)
            thresh_pt_ident(j)=max(target_sig_clean(:,j))+.01;
        else
        %otherwise use the first bin were a zero value occurs
            thresh_pt_ident(j)=bins(count+count1);
        end
    end

    target=zeros(num_pixels, num_tgt_maps);
    for j=1:num_tgt_maps
        ind_tgt = target_sig_clean(:,j)>thresh_pt_ident(j);
        target(:,j)=ind_tgt;
    end

    target_vec=zeros(num_pixels,1);
    for j=1:num_tgt_maps
        target_vec=target_vec + target(:,j);
    end
%end
%-----------------------------------------------------------------------
%Checks both sides of the selected target signals for target pixels if user
%specified this option
if threshold_both_sides==1
    target_sig_clean_left=-target_sig_clean;
    for j=1:num_tgt_maps
        bins=[];
        freq=[];
        bins=(min(target_sig_clean_left(:,j))):bin_width_ident:...
            max(target_sig_clean_left(:,j));
        freq=hist(target_sig_clean_left(:,j),bins);
        count=1;
        for i=1:size(bins,2)
            if bins(i)<0
                count=count+1;
            else
                break
            end
        end
        count1=1;
        for i=count+1:size(freq,2)
            if freq(i)> 0;
                count1=count1+1;
            else
                break
            end
        end
        if count+count1 > size(bins,2)
            thresh_pt_ident_left(j)=max(target_sig_clean_left(:,j))+.01;
        else
```

```
            thresh_pt_ident_left(j)=bins(count+count1);
        end
    end


    target_left=zeros(num_pixels, num_tgt_maps);
    for j=1:num_tgt_maps
        ind_tgt = target_sig_clean_left(:,j)>thresh_pt_ident_left(j);
        target_left(:,j)=ind_tgt;
    end

    target_vec_left=zeros(num_pixels,1);
    for j=1:num_tgt_maps
        target_vec_left=target_vec_left + target_left(:,j);
    end
    target_vec=target_vec+target_vec_left;
end
%----------------------------------------------------------------------
target_pic = reshape(target_vec,num_lines,num_col);
%----------------------------------------------------------------------
%----------------------------------------------------------------------
end
%----------Plot Target Signals with Calculated Thresholds-----------------
if show_plots ==1
    if size(rind,1)~=0
        d=ceil(sqrt(num_tgt_maps));
        linetrh_ident=[];
        for j=1:num_tgt_maps
            linetrh_ident(:,j)=thresh_pt_ident(j)*one;
        end
        if threshold_both_sides==1
            for j=1:num_tgt_maps
                linetrh_ident_left(:,j)=-thresh_pt_ident_left(j)*one;
            end
        end
        figure(8)
        for j=1:num_tgt_maps
            subplot(d,d,j)
            plot(target_sig_clean(:,j),'.', 'MarkerEdgeColor','r');
            hold on
            plot(linetrh_ident(:,j),'LineWidth',2);
            if threshold_both_sides==1
                hold on
                plot(linetrh_ident_left(:,j),'LineWidth',2);
            end
            xlabel('Pixel');
            ylabel('Abundance (IC Score)');
            title({sprintf('Map %i \n SNR %4.3f \n Max Score %4.3f',rind(j),...
                PT_SNR(rind(j)),maxim(rind(j))),'Potential Target'},...
                'fontweight','b');
            axis([0,num_pixels,-10,30]);
        end
        clear linetrh_ident
    end
    clear one
end
%----------------------------------------------------------------------

%-------Grade Performance of AutoGAD if Truth Mask was Provided------------
if temp3~=0;
%----------------------Confusion Matrix Calculation------------------------
```

```
    ConfusMat=[];
    ConfusMat(1,1)=0; %(TP)
    ConfusMat(1,2)=0; %(FP)
    ConfusMat(2,1)=0; %(FN)
    ConfusMat(2,2)=0; %(TN)

    for i=1:num_pixels
        if target_vec(i,1)>= 1 && data_matrix_truth(i,1) >= 1
            ConfusMat(1,1)=ConfusMat(1,1)+1;
        else
            if target_vec(i,1)>= 1 && data_matrix_truth(i,1) == 0
                ConfusMat(1,2)=ConfusMat(1,2)+1;
            else
                if target_vec(i,1)== 0 && data_matrix_truth(i,1) == 1
                    ConfusMat(2,1)=ConfusMat(2,1)+1;
                else
                    if target_vec(i,1)== 0 && data_matrix_truth(i,1) == 0 || 2
                        ConfusMat(2,2)=ConfusMat(2,2)+1;
                    end
                end
            end
        end
    end

    APER = (ConfusMat(1,2)+ConfusMat(2,1))/(num_pixels);
    TPF = ConfusMat(1,1)/(ConfusMat(1,1)+ConfusMat(2,1));
    FPF = ConfusMat(1,2)/(ConfusMat(1,2)+ConfusMat(2,2));
    Perc_tgt = ConfusMat(1,1)/(ConfusMat(1,1)+ConfusMat(1,2));
%---------------------------------------------------------------------------


%-------------------Show Target Locations to the User----------------------
%    target_vec_color=zeros(num_pixels,1);
%    for i=1:num_pixels
%        if target_vec(i,1)>=1 && data_matrix_truth(i,1)>=1
%            target_vec_color(i,1)=4;
%        elseif target_vec(i,1)>=1 && data_matrix_truth(i,1)==0
%            target_vec_color(i,1)=2;
%        end
%    end
%    target_pic_color = uint8(reshape(target_vec_color,num_lines,num_col));
%    if size(rind,1)~=0
%        figure(9)
%        imshow(mat2gray(target_pic_color));
%        colormap('Hot')
%        title(sprintf('TPF = %4.6f \n FPF = %4.6f \n Percent TGT = %4.6f',...
%            TPF, FPF,Perc_tgt),'fontweight','b');
%        impixelinfo;
%    elseif size(rind,1)==0
%        figure(9)
%        imshow(target_pic);
%        title('No Targets Detected')
%    end
%    figure (2)
%    imshow(truth,[]);
%    title('Truth Mask');
%    impixelinfo;
%else
%    if size(rind,1)~=0
%        figure(9)
%        imshow(target_pic)
```

```
%        title({'Suspected Target Pixels'});
%        impixelinfo;
%    elseif size(rind,1)==0
%        figure(9)
%        imshow(target_pic)
%        title({'No Targets Detected'});
%        impixelinfo;
%    end
end
time=toc;

newres = [time,TPF,FPF,Perc_tgt];
load RPDresults; %loads the results matrix stored in RPDresults.mat
results = [results; newres]; %adds the current runs results to the results matrix
save RPDresults results; %saves the modified results matrix before it is cleared for th
next run

clear all;
close all;
clc;
```

Published with MATLAB® 7.4

```
function [] = RPDFunc(params)
%This function iteratively calls a modified AutoGAD to test multiple
%settings for the algorithm in a single execution.  The results of AutoGAD
%are stored in the results matrix which is iteratively saved to
%'RPDresults.mat'

%Capt Matt Davis
%Jan 2009


[r,c] = size(params); %obtain dimensions of Design Matrix

for i = 1:r %runs AutoGAD using the parameters in RPDmatrix and saves results
to 'results'
    load RPDparams;
    params = params(i,:);
    i %displays iteration

    RPD_AutoGAD;

    %load RPDresults; %loads the results matrix stored in RPDresults.mat
    %results = [results; newres]; %adds the current runs results to the results matrix
    %save RPDresults results; %saves the modified results matrix before it is cleared
for the next run


end

%phonetext;


end
```

Published with MATLAB® 7.4

The code above controlled the passing of parameters to AutoGAD and recording output during testing.

Appendix D. Blue Dart

Its nighttime in Iraq and the darkness conceals an insurgent hard at work on a nondescript roadside. As he concludes his work planting an improvised explosive device (IED), he takes great pains to cover all evidence of his handiwork. Early the next morning an Unmanned Aerial Vehicle (UAV) armed to the teeth with cameras and sensors making its rounds at 50,000 feet captures a hyperspectral image of the piece of road where IED lies in wait.

Recent research efforts proposed several techniques to automatically detect anomalous objects like IEDs within hyperspectral images. However, most new algorithms are insufficiently verified to be robust to the broad range of data being made available. While finding ships in the ocean is one thing, locating tanks under camouflage netting at the edge of a tree line or well disguised roadside bombs is quite another.

The problem of noise (variation in inputs or operating environment) and the need for systems to be robust regardless of it, reaches far beyond software on a sensor platform. Consistent performance regardless of operating conditions is something all weapon systems should be designed for.

General Patton said, "A good plan, violently executed now, is better than a perfect plan next week." By extension, always finding 80% of the ships, tanks, and IEDs regardless of time of day or location is preferable to finding all the ships, tanks, and IEDs, but only when the conditions are just right.

Researchers at AFIT apply techniques known as Robust Parameter Design (RPD) to determine optimal system settings that maximize performance while minimizing output variance. The goal of this research is to improve upon the speed, accuracy, and robustness of automated systems to locate anomalies quickly and consistently regardless of the characteristics of the image presented to it.

By leveraging the power of RPD during the design phase of the detection algorithm, the AFIT researchers expect to improve algorithm performance and deliver an algorithm to the warfighter that can locate anomalies within a scene quickly and consistently.

The use of RPD is widespread, including everything from packaging toothpaste to high speed fluid dynamics. While future engagements will continue to require the development of specialized weapons, RPD can ensure those weapons are consistently effective wherever and whenever the engagement occurs.

Back at 50,000 feet, onboard image processing hardware executes a few lines of code that quickly scan the acres big image of the earth below and in a matter of seconds passes on to a user the exact location of a spot on the side of the road that doesnt look quite like it should. Despite the insurgents efforts, the UAV spots that somethings amiss with a particular stretch of road and an Explosive Ordinance Disposal (EOD) team is dispatched to investigate and safely dispose of the IED.

The most amazing part of this scenario is not the sensor laden, but pilotless aircraft; or even the fearless EOD team; but the 1000 or so lines of code sitting in a computer at 50,000 feet that instantly identified something suspicious within the collected image. This little piece of software wouldve been easily fooled if not for the training via RPD it received during its development.

Vita

Captain Matthew Davis graduated from Salina Central High School in Salina, Kansas in 1997. He entered undergraduate studies at Southwest Baptist University in Bolivar, Missouri where he graduated Cum Laude with a Bachelor of Science degree in Mathematics in May 2001. He was commissioned through Officer's Training School at Maxwell AFB, Alabama.

His first assignment was at the Space Vehicles Directorate of the Air Force Research Laboratory, Hanscom AFB, MA. As an Optical Turbulence Engineer at AFRL, he oversaw campaigns to collect upper atmospheric optical turbulence data enabling development of a predictive optical turbulence model for the Airborne Laser program. He also served as Deputy Program Manager for Weather Impact Decision Aids at AFRL. He provided direct support to warfighters during the initial phases of OIF who used WIDA tools to prepare for the first missions of the invasion. In December 2004, he moved on to become Lead Analyst for Military Satellite Communications and Space Force Enhancement at Detachment 4, Operational Test and Evaluation Center, Peterson AFB, CO. While at Det 4, he oversaw the planning, execution, and analysis of multi-service operational tests for the Wideband Global Satellite and Global Broadcast Service programs. In August 2007, he entered the Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to the Warrior Preparation Center, Einsiedlerhof Air Station, Germany.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704–0188

1. REPORT DATE *(DD–MM–YYYY)*
26–03–2009

2. REPORT TYPE
Master's Thesis

3. DATES COVERED *(From — To)*
Mar 2008 — Mar 2009

4. TITLE AND SUBTITLE
Using Multiple Robust Parameter Design Techniques To Improve Hyperspectral Anomaly Detection Algorithm Performance

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Davis, Matthew T., Captain, USAF

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Air Force Institute of Technology
Graduate School of Engineering and Management (AFIT/EN)
2950 Hobson Way
WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/GOR/ENS/09-05

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
N/A

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Detecting and identifying objects of interest is the goal of all remote sensing. New advances, specifically in hyperspectral imaging technology have provided the analyst with immense amounts of data requiring evaluation. Several filtering techniques or anomaly detection algorithms have been proposed. However, most new algorithms are insufficiently verified to be robust to the broad range of hyperspectral data being made available. One such algorithm, AutoGAD, is tested here via two separate robust parameter design techniques to determine optimal parameters for consistent performance on a range of data with large attribute variances. Additionally, the results of the two techniques are compared for overall effectiveness. The results of the test as well as optimal parameters for AutoGAD are presented and future research efforts proposed.

15. SUBJECT TERMS
Hyperspectral Anomaly Detection, Robust Parameter Design, Categorical Noise, Taguchi Method, Response Surface Methodology

16. SECURITY CLASSIFICATION OF: a. REPORT	b. ABSTRACT	c. THIS PAGE	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
U	U	U	UU	157	Dr. Kenneth W. Bauer, Jr., (ENS)
					19b. TELEPHONE NUMBER *(include area code)* (937) 785-3636; e-mail: kenneth.bauer@afit.edu